GENB
YOUNG BIOVOICES FOR A SUSTAINABLE FUTURE

D2.3 Deliverable

Report on Inspire, Inform and Educate activities

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OUR CONSORTIUM

APRE Agenzia per la Promozione della Ricerca Europea
btg biomass technology group
LOBA®
PEDAL CONSULTING
European Schoolnet
ZSI
aiju Instituto Tecnológico de Producto Infantil y Ocio
Q-PLAN INTERNATIONAL
FVA NEW MEDIA RESEARCH
Hellenic Society for the Protection of Nature

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Abstract	This deliverable consists of a report (linked to the second reporting period) on the "Inspire, Inform, Educate" activities carried out under WP2. D2.3 is linked to all tasks of WP2.

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2.0		Chiara Pocaterra, Flavia Fusconi & Laura Mentini (APRE)	Final revision

Table of Abbreviations and Acronyms

Abbreviation	Meaning
AIJU	ASOCIACIÓN DE INVESTIGACIÓN DE LA INDUSTRIA DEL JUGUETE CONEXAS Y AFINES
APRE	Agency for the Promotion of the European Research
AT	Austria
BCF	EC Bioeconomy Changemakers Festival, held in March 2024
BE	Belgium
BIOBEC	H2020 project, GA No. 101023381, https://biobec.eu/
BIOBEO	Horizon Europe project, GA No. 101059900, https://www.biobeo.eu/
BIOBRIDGES	H2020 project, GA No. 792236, https://www.biobridges-project.eu/
BIOGOV.NET	Horizon Europe project, GA No. 101060742, https://www.biogov.net/
BIOVOICES	H2020 project, GA No. 774331, https://www.biovoices.eu/
BIOWAYS	H2020 project, GA No. 720762, https://www.bioways.eu/
BLOOM	H2020 project, GA No. 773983, https://bloom-bioeconomy.eu/
BTG	BTG BIOMASS TECHNOLOGY GROUP BV
CBE JU	Circular Bio-based Europe Joint Undertaking
DDW	Dutch Design Week
DE	Germany
EL	Greece
ENGAGE4BIO	Horizon Europe project, GA No. 101059565, www.engage4bio.eu/
ERN	European Researchers' Night, a Europe-wide public event
ES	Spain
EU	European Union, or EU-wide (aka Pan-European)
EuBioNet	European Bioeconomy Network
EUN	EUN Partnership AISBL
FCL	Future Classroom Lab (a facility at European Schoolnet)
FVA	FVA SAS DI LOUIS FERRINI & C
GA	Grant Agreement
H2020	Horizon 2020
HSPN	HELLENIC SOCIETY FOR THE PROTECTION OF NATURE
IBL	Inquiry-based learning
IP	Implementation Plan for WP2
IR	Report on Inspire, Inform and Educate activities (Implementation Report for WP2)
IT	Italy
KER	Key Exploitable Result

KPI	Key Performance Indicator
LOBA	GLOBAZ, S.A.
MOOC	Massive Open Online Course
NL	The Netherlands
PEDAL	PEDAL CONSULTING SRO
PT	Portugal
Q-PLAN	Q-PLAN INTERNATIONAL ADVISORS PC
QR	Quick R
RPG	Role-Playing Game
SDC	STEM Discovery Campaign
SK	Slovakia
SPW	Science Projects Workshop (a Scientix format)
STEM	Science, Technology, Engineering, and Mathematics
STE(A)M IT	Erasmus+ project, GA No. 612845, steamit.eun.org/
SY	School year
T	Task
TED	Technology, Entertainment, Design
TEDx	A specific type of TED conference
TRANSITION2BIO	H2020 project, GA No. 101000539, www.transition2bio.eu/
UNIBO	ALMA MATER STUDIORUM - Università di Bologna
WP	Work Package
y.o.	Years old
ZSI	ZENTRUM FÜR SOZIALE INNOVATION GMBH

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1. Executive Summary

WP2 maximises the exploitation of contents and innovative approaches collected and co-created in WP1 through an integrated package of "Inspire, Inform and Educate" activities tailored to all the GenB target ages, teachers, and other multipliers, in local languages in partners' countries, in the context of large-scale events, ad hoc settings and piloting schools. WP2 objectives include:

- To grow the citizens, workforce, and decision makers of the sustainable future by increasing awareness of the environmental, social, and economic benefits of sustainable and circular bioeconomy and bio-based sectors (T2.1)
- To experiment new ways of attracting talent in the life science, technology, and the bioeconomy opportunities (T2.2)
- To promote the transition towards a more sustainable production, consumption, and lifestyle of the new generations (T2.3)
- To maximise the impact of GenB by channelling the bioeconomy education strengthening the knowledge of teachers (T2.4)
- To increase GenB impact and to reach wider audiences by engaging and supporting multipliers (T2.5)

This document provides the implementation report (IR) for WP2 "Inspire, Inform & Educate" activities. The WP leader (BTG) coordinated the preparation of this document, defining the methodological approach with the support of all format leaders (AIJU, APRE, BTG, EUN, FVA, and PEDAL). The content of this document was provided by the staff of all consortium members.

The objective of this deliverable is to provide a brief overview of the results achieved and experiences gained implementing WP2 activities. The report provides for each of the WP2 formats/activities implemented under the five WP2 tasks:

- the concept of the format/activity, and the prior experience with it.
- the activities implemented in GenB (to date).
- the main lessons learned before and during GenB implementation.

This document provides primarily qualitative information. Some quantitative information on WP2 implementation results (e.g. performance vis-à-vis the key performance indicators - KPIs) is also included. Full details on performance vis-à-vis KPs are provided in D4.2 (Impact monitoring and assessment strategy – first period), D4.3 (Impact monitoring and assessment strategy – second period) and the associated self-check global table.

2. Introduction

2.1 Background on the GenB project

GenB contributes to the implementation of the updated 2018 EU Bioeconomy Strategy and the European Green Deal priorities, and the achievement of a climate-neutral Europe by 2050 and the Sustainable Development Goals, involving the most relevant awareness and education EU-funded projects and initiatives, wide European and International school networks, and experts in socio-economic science and humanities.

GenB overall objective is to raise the Generation Bioeconomy (GenB), aware, sensitive, and interested in environmental issues, sustainability, and circularity.

2.2 Target groups

Within GenB, the following target groups are distinguished (see Table 1): Pre and early-school (4-8 years old), Elementary school (9-13 years old), High school (14-19 years old), Teachers, Multipliers, Parents, and Policymakers. As shown in the table below the seven target groups can be grouped into four clusters (Young people, Multipliers, Parents and Policymakers).

<table>
<tr><th colspan="2">Young people</th><th colspan="2">Multipliers</th></tr>
<tr><td>  </td><td>Pre- and early-school
(4-8 y.o.)</td><td>  </td><td>Teachers (formal education professionals targeting all ages students)</td></tr>
<tr><td>  </td><td>Elementary school
(9-13 y.o.)</td><td rowspan="2">  </td><td rowspan="2">Other multipliers (non-formal education professionals: youth organisations, community groups, museums, science communicators, amusement parks, journalists and media, NGOs). Experts' groups and communities of practices in education.</td></tr>
<tr><td>  </td><td>High school
(14-19 y.o.)</td></tr>
<tr><th colspan="2">Parents</th><th colspan="2">Policy makers</th></tr>
<tr><td>  </td><td>Young people' parents and in general the families.</td><td>  </td><td>Public authorities and policy makers related to education at local, national, and European level (Ministries of Education, European Commission DG R&I and DG Education and Culture).</td></tr>
</table>

Table 1 - GenB target groups.

2.3 WP2 Objectives

As stated in Grant Agreement (GA) "WP2 maximises the exploitation of contents and innovative approaches collected and co-created in the first Work Package[1] through an integrated **package of "Inspire, Inform and Educate" activities** tailored to all the GenB target ages, teachers, and other multipliers, in local languages in partners' countries, in the context of large-scale events, *ad hoc* settings and piloting schools (reached mainly through EUN and HSPN)".

WP2 objectives include:

- To grow the citizens, workforce, and decision-makers of the sustainable future by increasing awareness of the environmental, social, and economic benefits of sustainable and circular bioeconomy and bio-based sectors (Task 2.1)
- To experiment new ways of attracting talent in the life science, technology, and the bioeconomy opportunities (Task 2.2)
- To promote the transition towards a more sustainable production, consumption, and lifestyle of the new generations (Task 2.3)
- To maximise the impact of GenB by channelling the bioeconomy education strengthening the knowledge of teachers (Task 2.4)
- To increase GenB impact and to reach wider audiences by engaging and supporting multipliers (Task 2.5)

2.4 WP2 Organisation

For the implementation of WP2, a distinction is made between formats, tasks, and activities.

Format refers to a general plan of organisation, arrangement, or choice of material. As specified in the GA, in GenB 17 different formats have been implemented and they will be continuing to be implemented. The intention of GenB is to explore formats in two ways.

- Firstly, to assess what worked and works best when implementing a specific format.
- Secondly, to assess how best to combine and integrate different formats, not only those that are part of WP2 but also formats included in WP1 (Co-creation of innovative approaches) and WP3 (Engage, Empower & Take a role).

For each format in WP2, a **format leader** is in charge. An overview of the format leaders is presented in Appendix 1: List of formats and format leaders. The format leader has prior

[1] WP1 "Co-creation of innovative approaches" co-creates innovative approaches for awareness, information and education on bioeconomy, environmental issues, sustainability and circularity and cooperation between teachers, parents, and youth to drive collaboratively the bioeconomy transition towards a more sustainable production, consumption and lifestyles designing tailored toolkits.

experience developing and applying the format in one or more (earlier or ongoing EU-funded bioeconomy) projects. The format leader transfers knowledge of the format. Knowledge transfer shall first and foremost be targeted at internal parties (project consortium members), but external parties (third parties) can also benefit. For use within GenB, it has been necessary to adapt/refine existing formats (e.g., modify the visualisation, refine the scope, rephrase the content, translate the content, etc.).

The 17 GenB formats are clustered into five different **tasks**, reflecting the five WP2 objectives, and each led by a task leader. The last two tasks address formal and non-formal educators, whereas the first three tasks are aimed at young people, usually of all three age classes, as follows:

- **T2.1 Inspire and inform young people on sustainable and circular bioeconomy and bio-based sectors:** This task showcases inspirational real-life examples of bioeconomy and bio-based products. Lead: HSPN.
- **T2.2 Inspire and inform students in bioeconomy careers.** This task experiments activities to attract new generations on bioeconomy-related careers. The task uses the toolkits[2] developed in T1.4. Lead: BTG.
- **T2.3 Educate young people to promote the biotransition:** This task promotes sustainable and circular behaviours and lifestyles through the delivery of dedicated educational activities. The task uses the toolkits developed in T1.4. Lead: BTG.
- **T2.4 Educate teachers in teaching the bioeconomy:** This task equips teachers with a package of knowledge and capacities to train their students in bioeconomy through online courses, based on the toolkits developed in T1.4. Lead: EUN.
- **T2.5 Inform and educate other multipliers to promote the bioeconomy.** This task engages and supports non-formal educators (such as museums, theatres, festivals, etc.) to act as multipliers by adopting the toolkits developed in T1.4. Lead: PEDAL.

The task leaders are charged mainly with co-authoring both editions of the Implementation Report for WP2 (Interim version -D2.2- due M18/April 2024; Final version -D2.3- due M28/Feb 2025).

An **activity** is something you do, or something that happens. In the context of GenB, activity refers to the implementation of a format in a specific country by the **activity leaders**. Depending on the context in which the GenB activity is implemented, it may be necessary to make (further)

[2] GenB Toolkit/s: A GenB Toolkit is a compilation of materials and resources aimed at promoting knowledge about the Bioeconomy and enabling the acquisition of significant learning on the subject. In T1.4 of GenB, "Co-creation of innovative approaches", a set of educational toolkits is being developed to cover WP2 and WP3 activities addressing all target groups (pre- and early-school children, 4-8 years old; elementary school students, 9-13 years old; high school students, 14-19 years old; teachers; other multipliers).

refinements to the GenB format. As each GenB format has been implemented in between 1 and 9 countries, there are ca. 75 activities in total[3]. Many but not all activity leaders have prior experience implementing the activity, or something similar, in their respective countries.

The organisation levels and the different roles in WP2 are summarised as follow:

Role	Responsibility in WP2	Tasks in relation to current report
WP leader	Provide support and keep eye on general progress in WP2	Monitor general progress of WP2. Document editing.
Task leader	Monitoring task implementation progress	Provide relevant content for the current report
Format leader	Transfer knowledge on the format	
Activity leader	Planning and implementing the format in a specific country	

Table 2 - Management levels and roles in WP2.

2.5 Scope of the Implementation Report for WP2

The current document is the Report on Inspire, Inform and Educate (IR). It describes implemented activities, focusing more on qualitative information[4]. This IR is a public deliverable. Depending on their role (Task leader, Format leader, Activity leader) all GenB partners have contributed content.

This document is structured by task. The five tasks within WP2 are each covered in a dedicated chapter. The 2-5 formats within a WP2 task are each covered in a dedicated sub-chapter. Within each of the five WP2 tasks, up to 5 formats have been implemented, for a total of 17 formats. This yields the following overall document structure:

- Chapter 3 discusses implementation of T2.1 Inspire and inform young people.
- Chapter 4 discusses implementation of T2.2 Inspire & inform students in bioeconomy careers.
- Chapter 5 discusses implementation of T2.3 Educate young people to promote the biotransition.
- Chapter 6 discusses implementation of T2.4 Educate teachers in teaching the bioeconomy.
- Chapter 7 discusses implementation of T2.5 Inform and educate other multipliers to promote the bioeconomy.
- Chapter 8 discusses Conclusions.

[3] Where relevant and practical, multiple formats can and will be combined when implementing an activity.
[4] More quantitative information on implemented activities will be reported continuously in the context of WP6 “Project management” and WP4 “Impact assessment and policy recommendations”. In detailed Excel worksheets, WP6 keeps track of all activities implemented across the project and WP4 keeps track of the fulfilment of Key Performance Indicators (KPIs) associated to GenB activities.

Finally, the Appendices cover:

- Appendix 1 lists Activities (formats), KPI and target groups.
- Appendix 2 lists the distribution of activities (formats).
- Appendix 3 provides additional information regarding activities implemented in Spain.
- Appendix 4 is a report of the GenB MOOC.

3. Inspire and inform young people

Task 2.1 "*Inspire and inform young people on sustainable and circular bioeconomy and bio-based sectors*" showcases inspirational real-life examples of bioeconomy and bio-based products through the following formats and activities:

- Task 2.1a: Hands-on labs and playful activities in each country
- Task 2.1b: Bioeconomy village at large scale events
- Task 2.1c: Inside the bioeconomy experiential exhibitions
- Task 2.1d: BioArt Gallery at large scale events

Table 3 presents an overview of the Task 2.1 formats/activities to inspire and inform young people on bioeconomy, the countries where activities were implemented, and the associated KPIs.

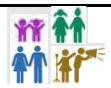
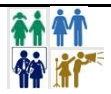
Activity	Target	What for	KPI	Target Countries
Hands-on labs and playful activities		Playful activities and hands-on labs with bioeconomy experiments (including activities like creating biomaterials)	#400 young people	AT, EL, IT, NL, PT, SK, ES, EU
Bioeconomy village at large scale events		Format promoting bioeconomy in the context of large-scale events to attract interest, raise awareness and stimulate curiosity and discussion	#40.000 people	EL, IT, PT, SK
Inside the bioeconomy experiential exhibit		Bio-based experiential exhibit in existing public spaces	#4.000 people	NL, PT, ES, EU
BioArt Gallery (in 9 languages)		Formats (large pictures; roll-ups) promoting bioeconomy in the context of large-scale events	#40.000 people	EU

Table 3 - WP2 formats to inspire and inform young people on bioeconomy.

Beyond the above formats, which are all foreseen in the GenB GA, APRE developed a new format, *participatory photography*, which aims to narrate, investigate the circular bioeconomy, and activate our gaze on everyday sustainability. The format was piloted in the WP1 Living Lab organised in 2023 at I.C Guicciardini Roma and implemented by the Italian and Slovak Partners. APRE's experience with developing and piloting the format is described at the end of this chapter.

3.1 Hands-on labs and playful activities in each country (T2.1a)

3.1.1 Concept of the format/activity and prior experience

Concept: Organisation of hands-on labs for kids to actively engage them in experiments with the aim of discovering many uses for bio-waste (e.g. coffee-grounds, orange peels and eggshells), and see how they can be transformed into products such as cleaning scrubs, natural colour, paper, and bioplastic. The labs for kids seek to communicate knowledge of the bioeconomy and bio-based solutions in an easy, experiential, and comprehensive way.

Inspirational previous experience: The labs for kids build on experiences like the "Bioeconomy Village" (see section 3.2) and the "Bio Art Gallery" (see section 3.4) implemented in the BIOWAYS and BIOVOICES projects at large-scale international exhibitions. They also draw from the BIOVOICES book for kids "What's Bioeconomy?" and the associated extensive knowledge sharing and testing that went into creating the book for children. These hands-on activities were deployed in the context of Transition2BIO in different environments and countries, as well as in different contexts and formats, confirming the flexibility and adjustability of the concept and materials available. Ten (10) hands-on experiments were developed using simple materials available from home (the first five experiments can be run with minimal equipment e.g. without a stove/microwave).

These experiential labs aim to raise awareness and facilitate the understanding of bioeconomy through hands-on activities, informing and educating kids about all bioeconomy areas (natural ecosystems, primary production, processing), to produce food, materials, and energy, by touching, feeling, smelling, and exploring the bioeconomy. The goal is to deploy these activities in contexts where the kids and families are already participating (museums, festivals, fairs, school activities, etc.), thus maximising the impact.

The labs for kids are targeted at children aged 5 to 8 years old[5]. However, the hands-on experiments also helped to educate kids' parents, grandparents, teachers, and other adults who participated together with the children in their experiments.

3.1.2 Activities implemented

Activity	Target	What for	KPI	Target Countries
Hands-on labs and playful activities		Playful activities and hands-on labs with bioeconomy experiments (including activities like creating biomaterials)	#400 young people	AT, EL, IT, NL, PT, SK, ES, EU

Table 4 - WP2 format 2.1a: hands-on labs and playful activities in each country - key characteristics.

All GenB partners and all countries are involved in organising "Hands-on labs" and playful activities in their respective countries. They engaged schools and participated in different events related to the bioeconomy and conducted various experiments with children and young adults

[5] Nonetheless, the experiments can be attractive to individuals of other age classes to. For example, the coffee-scrub is quite popular with teenagers and even adults.

(including activities like creating biomaterials). In the case of AIJU and EUN, the organisation differed slightly, enriching the experience gained in GenB with the hands-on lab concept:

- Rather than in the classroom or at events, AIJU has organised the hands-on labs at its ToyLab Experience (Figure 1), an innovation centre for children that provides a space for the development of workshops and activities related to bioeconomy and sustainability.

Figure 1 - AIJU ToyLab Experience

- EUN's target group are teachers and educators working in formal education. In the case of EUN, the hands-on labs were implemented as a stream in a Scientix-Bioeconomy Award, as part of the 2024 STEM Discovery Campaign (SDC). The award invited all teachers and educators working with students from the ages of 4 to 19 years old in Europe and beyond.

Implementation findings

The results of the hands-on labs implemented to data can be summarised as follows:

- Hands-on labs were implemented (i) in the classroom, in collaboration with schools; (ii) in the context of large national events, (iii) in non-formal education settings, and (iv) as a virtual event within the 2024 STEM Discovery Campaign.
- Depending on the main age group targeted and the context, hands-on labs involving different playful activities were implemented. In some countries, the topic of the lab/activities was adjusted according to the needs of teachers of specific subjects, like Home Economics and Science. Some hands-on labs were organised in the context of the GenB Living Labs (see D1.2 Report on co-design activities).
- Participants in the hands-on labs are mostly primary and elementary school students (resp. 4-8 years old and 9-13 years old), their teachers and their families. In Portugal, one of the hands-on labs organised by LOBA specifically targeted children from vulnerable groups.
- Examples of implemented playful activities ranged from (a) making seed bombs, (b) making and using paint derived from plants and vegetables as well as from spices, (c) producing bioplastic from orange peels, (d) making biogas from eggshells and vinegar (e) making natural water colours from fruits and vegetable, etc.
- Beyond the hands-on experiments inherited from earlier projects, APRE developed three new hands-on experiments and transformed these into easy-to-use educational factsheets. The new experiments were piloted in Rome in three classrooms and in an open-air large-scale event in the period March-June 2023.

1. Use fruits, vegetables, and spices creatively: make beautiful watercolours!
2. Try to produce your own bio-based plastic from corn starch!
3. Make homemade natural toothpaste!

- The duration of the activity depends on the context. When collaborating with schools, the activity typically lasts up to 2 hours per group of students or classroom. When organised in the context of a "green" event activities are often implemented continuously during the event's opening hours (one or multiple days) (see Figure 2 and Figure 3).

Figure 2 - Hands-on experiment: make bio-based plastics from corn starch and glycerine, IC Guicciardini, April 2023, Rome (left). Hands-on experiment: make natural watercolours, IC Guicciardini, May 2023, Rome (middle and right).

Figure 3 - Hands-on experiment: make natural watercolours, Doposcuola Mammut, June 2023, Rome.

In more detail, the implementation of the hands-on labs involved the following:

First Reporting Period (until April 2024)

In **Austria,** ZSI performed a hands-on lab producing bioplastic from orange peels, at the high school AHS Karajangasse in Vienna with a group of 16 and 17 years old. students. Furthermore, hands-on labs were organised in a primary school near Vienna. ZSI together with about 100 6–10 years old. made seed bombs, painted using paint derived from plants and vegetables as well as from spices, and played the bioeconomy memory game from the Transition2Bio project.

In **Greece**, the "hands-on lab" concept was organised twice. Firstly, by Q-PLAN in Thessaloniki within a classroom setting in collaboration with the 1st Junior High School of Kalamaria, involving a group of 12 students who were immersed in the bioeconomy using three experiments (coffee scrub, natural colour fun and biogas factory in a bottle). Secondly by HSPN in Athens within a small theatre setting in collaboration with the Athens College Bodossaki Elementary School, involving 350 students (2nd, 3rd and 4th graders), in the form of an experiential seminar (due to the large number of students), using two experiments (natural colour fun and biogas factory ballon), bio-based Christmas decorations crafting activity, as well as an audiovisual presentation specifically created by the HSPN educational team targeted to this specific age group.

In **Italy**, APRE implemented hands-on experiments in 4 classrooms of a primary and low-secondary public school (I.C Guicciardini) in Rome between March and June 2023. This school was chosen for its creativity, good practices, and sensitivity towards environmental sustainability issues. Moreover, APRE realised the activity in an afterschool open-air event (non-formal learning setting), also in Rome, with ca. 50 kids of primary age group and their families in a disadvantaged educational setting. The following experiments were developed: Bioplastic from oranges, Bioplastic from milk, Bioplastic from eggs, Biodegradable bag, Cabbage experiment and Natural watercolours (Figure 4).

Figure 4 - Hands-on experiments conducted at I.C Guicciardini in Rome between March and June 2023.

In March 2024, APRE and FVA, together with ScienzaInsieme and Cluster Spring, coordinated the Rome edition of the Italian Bioeconomy Changemakers Festival, organised by the European Commission (EC) in Brussels between 11 and 17 March 2024, in collaboration with Lazio Innova and Unitelma Sapienza. Ahead of the event, FVA trained the eight FabLabs of Lazio Innova on how to implement hands-on activities. The GenB training enabled the FabLabs in turn to involve some 200 high school students and teachers, originating from the whole Lazio region, in IBCF events. Moreover, on 23 March 2024, FVA organised a hands-on lab with kids aged 7-12, in the context of the SOUx – the School of Architecture for Kids based in Taranto, Apulia Region (Figure 5). In this case, the 16 participating kids were engaged in the creation of bioplastics from bio-based residues.

Figure 5 - Kids at SOUx (Taranto) engaged in the creation of bioplastics from bio-based residues.

In **Portugal**, LOBA implemented one hands-on lab in March 2023 in the context of the National Consumer Meeting which saw the participation of schools targeting children from vulnerable groups from north Portugal. The format of the labs was "Natural Colour Fun", consisting of using cabbage, vinegar, and soda to create a natural purple colour and "Biogas Factory Ballon", consisting of using water, brewer's yeast, and water to inflate a plastic balloon. The formats stem from Transition2BIO project and have been tested in the past by LOBA. For this reason, the same formats were replicated in the context of the Bioeconomy Changemakers Festival – Aveiro edition on 14 March 2024, organised in conjunction with the Portuguese 17th National Mathematical Games Championship which saw the participation of 1800 students ranging in age from 7 to 18 old in total.

In **Slovakia**, the hands-on labs were a key part of the living lab activities realized in cooperation with the Gessayova Leisure Centre in Bratislava. In cooperation with schools, experiments - adopted from the Transition2BIO project- focusing on the production of seed bombs for pupils of 3 classes of primary and elementary schools in Bratislava were carried out in April – May 2023. Due to the success of these activities, the experiments (making flower bombs and scrubs from coffee grounds) became part of the workshop on the occasion of Earth Day, organised by the Gessayova Leisure Center for young people aged 6-15 years. Experiments (painting with natural colours, production of peeling from coffee grounds, production of cosmetic tampons from waste textile from natural materials) were also included in the programme of the March 2024 Bioeconomy Changemakers Festival in Nitra, where mainly pupils aged 8-9 years and 12-13 years participated.

In **Spain**, AIJU conducted two hands-on workshops in its ToyLab Experience, with a total of 50 students in the second year of primary school, aged 8-9 years old. The workshops took place on 22 and 25 March 2024 and lasted two hours. The main activity was focused on making homemade biogas (Figure 6). It was made with eggshells and vinegar. The children were able to

create biogas and see how the balloons that were placed in their bottles inflated after the chemical reaction.

Figure 6 - Hands-on lab conducted in Spain (left, middle). A child fills out the bioeconomy researcher's notebook (right).

In this context, AIJU launched the bioeconomy researcher's notebook, a friendly technique to collect pre- and post-feedback from participating children. The notebook is made up of the pre-activity and post-activity questionnaires set out in WP4. Through storytelling, children are informed that they are bioeconomy researchers and that their opinions will be vital to improving the materials and activities that are developed within the framework of the GenB project. Thus, participants are invited to complete the notebook during the workshop. The notebook is structured clearly, with ordered questions and language adapted to the target. It is very visual and attractive, as it is accompanied by images that illustrate the concepts. Regarding the scales used, the typical Likert scale is replaced by a scale with emoticons. This proposal is widely accepted in the academic world as the most appropriate for the age target with which the material is developed (Figure 6, most right photo). This material has been made known and shared with the rest of the members in case they find it interesting for their events and activities.

Finally, working at the **pan-European level** EUN instructed the participants of the 2024 STEM Discovery Campaign (SDC) to (i) implement different hands-on activities based on materials available in the GenB Virtual Library; (ii) write an implementation story reporting the activity; and (iii) post it to the 2024 STEM Discovery Campaign. A total of 29 hands-on labs were implemented ranging from waste sorting, soap making, and creation of seed balls to making facial cleansing masks from eggshells, producing fertilizer from organic waste, etc. The hands-on labs were implemented by 175 international teachers, with 1987 students of various ages, amongst which 2 winners were selected. In addition, 23 other participants were involved, such as parents and support staff.

<u>Second Reporting Period (since May 2024)</u>

In **Austria**, ZSI conducted hands-on experiments with visitors of the GenB stand at the European Researchers' Night 2024 held on 27 September in Graz Austria. Visitors of the station were able to paint using colours made from spices and algae. Additionally, some participants played the memory game from the Transition2Bio project.

Figure 7 – Hands-on experiments at the European Researchers 'Night 2024 in Austria.

In **The Netherlands**, BTG participated in three festivals at which hands-on experiments engaging younger people were demonstrated. The three new hands-on experiments that BTG developed (see D1.3) were piloted at the kids' science festival Expeditie Next held in the streets of the centre of the town of Zutphen on 1 May 2024, actively engaging 314 children (excluding accompanying persons). A selection of the experiments was demonstrated at the Dutch edition of the 2024 European Researchers' Night (held on 27 September 2024 at Forum Groningen) and again at the sustainable fashion festival Kleer'NZooi XXL, held on 5 October 2024 in Martinikerk Groningen.

Beyond the innovative materials developed by bioeconomy professionals at BTG, educational materials were also developed by Dutch youngsters. In spring 2024, BTG commissioned three groups of second graders from Bonhoeffer College (Enschede, The Netherlands) to develop a game to introduce young people in a playful way to the theme of bioeconomy. More information on this assignment and the outcomes can be read in the GenB news item here. In late 2024, BTG commissioned another assignment to three more groups of second graders from the same school. This time, they were charged to develop (parts of an) escape game. Work on the second assignment is ongoing at the time of writing (February 2025).

In **Portugal**, on 4 June 2024, LOBA organised hands-on activities with the students at Schoolé in Matosinhos, showcasing materials like corn-based plates and algae-derived phone cases. The session featured the What is Bioeconomy? Book, helping students visualise the environmental

impact of their choices. During the hands-on scientific session, students explored pH reactions and CO_2 production through experiments. Activities like making homemade exfoliants and flower bombs emphasized sustainable alternatives in daily life. The event concluded with an interactive quiz, reinforcing key concepts and inspiring students to embrace sustainability.

On May 15th and 16th 2024, LOBA introduced bioeconomy and circularity to students at Bandeira Elementary School in Gaia through hands-on sessions. Using the book *What is Bioeconomy?*, students learned how everyday materials, like apple peels and elephant faeces, can be transformed into useful products. Hands-on experiments, including pH reactions and CO_2 production, deepened their understanding of scientific principles in bioeconomy. Activities like making homemade exfoliants and flower bombs highlighted sustainable alternatives and environmental responsibility. The event left students inspired and excited about sustainability, reinforcing GenB's mission to empower the next generation.

Additionally, in November and December 2024, nine hands-on sessions were organised at primary schools in the Gaia district.

Figure 8 – Hands-on sessions in Portugal.

In **Slovakia**, PEDAL participated in the Regional Festival of Environmental Organisations "Play for a Green Region" in Žilina on 13 June 2024, where they organised and facilitated multiple activities, Hands-on-labs included, in collaboration with the Regional Development Agency for the Žilina Region.

Table 5 gives a short overview of the main hands-on labs organised.

Partner	Country	Venue(s)	Date(s)	Context
ZSI	Austria	Graz	Sep 2024	European Researchers' Night 2024 Graz edition

		Vienna	Apr-May 2023	Classroom at AHS Karajangasse (secondary school) and VS Südtstadt (primary school)
HSPN	Greece	Athens	15 Dec 2023	Classroom at Athens College Elementary School
		Athens	20-21 Apr 2024	Open event at Athens Science Festival
Q-PLAN	Greece	Thessaloniki	28 Nov 2023	Classroom at Junior High School
APRE	Italy	Rome	Mar-Jun 2023	Classrooms at ICG, Open events at Doposcuola
APRE & FVA	Italy	Rome	Feb 2024	Satellite event Bioeconomy Changemakers Festival
FVA	Italy	Taranto	23 Mar 2024	Classroom at SOUx
BTG	Netherlands	Zutphen	1 May 2024	Festival Expeditie Next (outdoor kids' science festival)
		Groningen	27 Sep 2024	European Researchers' Night 2024 Groningen edition
		Groningen	5 Oct 2024	Kleer'NZooi XXL
LOBA	Portugal	Aveiro	Oct 2023	Open event at Planetiers
		Aveiro	14 Mar 2024	Satellite event Bioeconomy Changemakers Festival
		Gaia	May 2024	Hands-on for primary school classrooms
		Matosinhos	June 2024	Hands-on for primary school classrooms
		Gaia	Nov 2024	6x Hands-on for primary school classrooms
		Gaia	Dec 2024	3x Hands-on for primary school classrooms
PEDAL	Slovakia	Various	All the time	Classrooms
		Various	All the time	Open events
AIJU	Spain	Valencia	Mar 2024	AIJU ToyLab experience
EUN	Pan-European	Various	Feb-Apr 2024	2024 SDC

Table 5 - WP2 format 2.1a: Hands-on labs and playful activities in each country – events organised.

Table 6 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	**Value**
Target countries	8
Countries with implementation (largely) completed	8

Countries with ongoing or planned implementation	0
Events implemented	>28
Participants engaged	>4400 (including 179 in AT, 934 in EL, 216 in IT, 685 in NL, 60 in PT, 185 in SK, 2185 Pan-European, and 50 in ES).
Targets to be engaged	400 young people

Table 6 -WP2 format 2.1a: Hands-on labs and playful activities - impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that **implementation of this task is fully completed**. The overall KPI has been achieved successfully.

3.1.3 Main lessons learned

General insights on the format

The experiments cover crucial topics like waste prevention, climate change, and renewable resources, fostering discussions on these topics with younger generations. These hands-on activities are easily replicable at home or school and can be integrated into larger initiatives like awareness campaigns and teacher training. They can be conducted in various settings, from large-scale events to classrooms, and can be presented in diverse formats (live or online) to adapt to different learning styles. Providing bio-based containers for children to take home their outputs enhances engagement and reinforces the sustainability of these activities. Integrating hands-on labs with a "Bioeconomy Village" booth attracts more visitors and sparks curiosity about bio-based materials. Online delivery, combining exhibitions with interactive activities, enhances student engagement but requires careful organisation and management to maintain attention. Hands-on labs have proven to be effective also with very young kids or disadvantaged groups (like in Taranto, Italy Gaio, Portugal), fostering inclusion and awareness through the valorisation of their capacities and creativity. Dedicated hands-on activities for teenagers or young adults (like do-it-yourself bioplastics) can be used to inspire and stimulate the discussion about bioeconomy.

Specific insights on the format

Note that various of the insights below are relevant in all WP2 formats.

1. **Children from different age groups respond differently** to the concepts of bioeconomy and bio-based products. Younger children (7-8 y.o.) were very enthusiastic about the experimental procedure and the direct outcomes they witnessed. Older children (8-9 y.o.), even though equally enthusiastic about the experiments, were more curious about the results and applications of the processes. 4th graders showed a better understanding of bioeconomy from an economic aspect and not just an environmental point of view; some even expressed their own business and management ideas revolving around biobased products and renewable energy. The ideas of bioeconomy and its applications, when

presented in fun and engaging ways, and accompanied with the enhancement of discussion and participation, can steer imagination and incentivise youngsters to learn more and become more active about environmental issues.

2. **Take advantage of interactive multimedia:** In larger events, an audiovisual presentation can be effective in conveying the basic ideas of bioeconomy and renewable energy in a simplified and relatable way (concepts presented through the eyes of an environmentally sensitive 1st grader, Rita). Including interactive elements like animation and music kept the AV presentation from becoming stiff, and stirred conversation between HSPN members, teachers, and children, resulting in several vivid Q&A sessions regarding bioeconomy and environmental awareness. The combination of conventional lecture-based approaches with multimedia (visual and auditory) elements and experiential learning can be effective in conveying elaborate and composite concepts in a way that captures attention and facilitates retention through dynamic content, catering to different audiences and learning styles, especially small children, and educators.
3. **Make a connection to the season of the year:** The inclusion of a Christmas angel ornament crafting activity, introduced the students to the concepts of using bio-based materials, repurposing old materials, and reducing waste, while at the same time engaging them in a fun, holiday-related activity and gave them the chance to create something they could take home, show their parents, and hang on the Christmas tree. Moreover, some of the students suggested making big batches of them to sell at the Christmas bazaar of the school, perfectly connecting the event with a bioeconomy activity undertaken by the students.
4. **Interactive activities** for children provide opportunities for youngsters to step out of their comfort zone, emerge as group leaders and overall change the classroom dynamics.
5. **Enhance technical definitions with examples that resonate or intrigue the target audience**. Besides adjusting the vocabulary, intonation, and structure of our discourse to convey technical concepts effectively to the target, it's crucial to **use examples** that vividly illustrate the ideas discussed, making them relatable and engaging. Therefore, when discussing concepts like bioeconomy, biogas, or materials and objects produced in a bioeconomy context, one should always aim to provide examples that are familiar to children's everyday experiences (e.g.: *Did you know that toys can be crafted from corn cobs? Were you aware that your sneakers could be manufactured from recycled plastic bottles?*) or intriguing examples (e.g.: *Did you know we can create school notebooks using elephant or horse dung paper?*). This approach not only facilitates a better comprehension of the underlying technical concepts but also sparks greater interest in learning and enhances the likelihood of knowledge dissemination to others.
6. **Transform uninteresting tasks for children into appealing and child-friendly proposals through play.** In the framework of the hands-on workshops, an A5 notebook has been developed containing the pre and post-questionnaires required by the project in WP4. It was given to each participant at the beginning of the session. It is presented to the participant as a "bioeconomy expert notebook" and they are invited, through storytelling, to actively participate in the evaluation and improvement of the activities. This type of notebook is one of the resources used by AIJU's child user research area to, among other

objectives depending on the research objectives, generate a commitment to participation in tasks that may initially generate rejection in the target group.

7. **Organisers need to incorporate relatable examples in the experiments' narrative** that build upon the sustainability concepts that students already know from home or school and encourage students' participation in the conversation. There has been no chance to implement this knowledge in other activities/ formats yet.
8. Prior and **structured organisation** is essential to conduct the experiments, especially in large-scale events or unstructured learning settings.
9. The experiments should be **tested** prior to being implemented. This practice helps to avoid difficulties or uncertainties stemming from unclear instructions and ensures a better preparation for a successful lesson.
10. The **three new experiments** have been very effective in involving young people (of different age groups) and their educators. They require minimal equipment and are very easy to replicate. The watercolour experiment, especially, has sparked a lot of interest in both young kids as well as their parents and teachers, who were attracted to this innovative yet very simple format.
11. The hands-on lab requires the use of **single-use plastics and materials to conduct the experiments in a clean and safe environment for the children** (plastic gloves, wet wipes, paper etc.). Moreover, the concept entails food waste (e.g. lettuce, coffee, milk, etc.) when demonstrating the experiments. In future implementations, zero-waste or low-waste processes shall be explored to keep the message of sustainability intact. This insight is relevant to all WP2 formats, i.e. it was applied in the organisation of the career info day (T2.2), including efforts to minimise the use of printed materials and food waste in catering.
12. **Managing participant engagement in specific environments:** The physical environment impacts participant engagement; consider this when planning sessions. Before the implementation of the hands-on experiments, a discussion session had been planned in the same room where the hands-on activities would later take place. When the participants got into the room which was already set up for the hands-on experiments, they "got their hands dirty". Therefore, it was somewhat challenging to keep the participants' attention during the introduction session which was held right before the hands-on experiments. Having this session in a separate room would have probably increased the participants' attention.
13. **Flexibility in timing:** Recognize the importance of flexibility in workshop timing especially for a station-based hands-on experiment set-up. The strict schedule based on the available time, number of participants and stations can make stations and activities demanding. Allowing more time for each segment would lead to a smoother and less stressful experience for both the moderators and participants.
14. **Designate a timekeeper:** Designating a moderator as a timekeeper and overseer is crucial to maintaining the flow and timing of activities in a station-based setting for hands-on experiments. This ensures that each station is adequately managed, and participants stay on track.
15. In general, the hands-on format works well if **combined with other formats** especially to draw in the younger target groups. It is recommended to combine hands-on labs with the

Bioeconomy Village format, to provide students with immediate information and tangible materials they can refer to when learning about bioeconomy.

3.2 Bioeconomy village at large scale events (T2.1b)

3.2.1 Concept of the format/activity and prior experience

The concept of the format/activity

The bioeconomy is closer to us than it seems at first glance. The aim of Bioeconomy Village is to show through various products and materials that it is in fact part of our daily lives. The collection allows visitors to look, touch, smell or even taste the bioeconomy and present sustainable bio-based alternatives to the things commonly used.

The original Bioeconomy Village showcases more than 350 different bio-based items. Based on previous experience, the Bioeconomy Village format proved to be an effective element in different types of events, including large-scale events. At this type of event attractive presentation of Bioeconomy Village (e.g., the use of a cardboard installation simulating rooms in a household with samples) attracts visitors to the project booth.

For the event organisers, it also serves as a good starting point for discussions not only to familiarize visitors with the bioeconomy, but also about more complex topics – such as the benefits but also risks of the bioeconomy or sustainable lifestyle.

The prior experience (prior to GenB) with the concept

Prior to GenB, the Bioeconomy Village has already been exhibited in >40 events directly involving >120,000 people in six countries (IT, BE, PT, SK, GR, DE) in the last 5 years. The Bioeconomy Village was tested within the BIOWAYS, Biobridges and Transition2BIO projects in various types of events or contexts. An unexpected positive effect of the COVID pandemic was the creative approach to these events, when the project partners tested the Bioeconomy Village at large-scale events, but also smaller events, in some cases directly in schools, with more or lesser strict anti-epidemic rules, organised indoors, under the open sky, or even online.

The strength of the format is that it is suitable for events without a fixed agenda and therefore without the possibility to prepare structured (educational) activities. It allows visitors to discover and organisers to respond flexibly to current questions and interest to visitors.

3.2.2 Activities implemented

The **Bioeconomy Village** format refers to a furnished exhibition booth featuring a large collection of bio-based products, supplemented as relevant with a collection of roll-up banners and other materials informing on the bioeconomy and bio-based products. The fully equipped booth, or parts thereof, can be showcased at exhibitions and large-scale events, enabling visitors

to experience, touch and feel the bioeconomy thus attracting interest, raising awareness, and stimulating curiosity and discussion. The full collection of more than 350 different bio-based product samples in everyday life applications, or a selection of these, can be shown in classrooms as part of a bioeconomy narrative.

The Bioeconomy Village was designed to create a fun and immersive experience for participants. It featured interactive exhibits that showcase the latest innovations in the field of bioeconomy, such as biodegradable packaging or bio-based textiles. In combination with two other GenB formats (hands-on labs, sub-task T2.1a, discussed above, and roll-up banners, sub-task T2.1d, discussed below) an engaging and green "corner" can be created attracting young students and families with practical and informative activities. The goal is to educate students and teachers about the principles of bioeconomy, the potential of bio-based products and materials, and the importance of sustainability. Target groups include elementary school students (9-13 years old), high school students (14-19 years old) and their parents.

Activity	Target	What for	KPI	Target Countries
Bioeconomy village at large-scale events		Format promoting bioeconomy in the context of large-scale events to attract interest, raise awareness and stimulate curiosity and discussion	#40.000 people	EL, IT, PT, SK

Table 7 -WP2 format 2.1b: Bioeconomy village at large scale events - key characteristics.

First Reporting Period (until April 2024)

In **Greece**, Bioeconomy Village was implemented during a 6-day (16-21 April 2024, Athens) science festival focusing on education (the first 4 days were dedicated to school visits) and popular science, the Athens Science Festival, the largest event of this type in Greece with visitors not only from Greece but also from across Europe. HSPN presented the Bioeconomy Village as an interactive exhibition of bioeconomy products, encouraging visitors to touch, feel or even smell the products and engaging in informative conversations with them about the types of biomaterials used and the processes entailed in their production. The activity was a big success amongst visitors of all ages and was characterised by the organisers as one of their most interesting displays for this year. The format was additionally combined with Bioeconomy Art Gallery, audiovisual material for all ages and hands-on lab activities.

Figure 9 - Bioeconomy Village during the Athens Science Festival in Greece.

In **Italy**, APRE implemented the Bioeconomy Village in two classrooms (primary and elementary) of the I.C. Guicciardini school (Rome), as integrating and supporting activities in the Living Labs and showcased the bioeconomy during the open school Sustainability Day (May 2023) to the entire school community, parents and external stakeholders.

FVA (Italy) is the owner and keeper of a comprehensive collection of bio-based products. The complete collection includes more than 350 different bio-based product samples. Different sets with smaller product collections (containing ca. 30-40 bio-based products) can be borrowed from other GenB partners that participated in the EU-funded Transition2Bio project. In 2023 FVA and APRE implemented the activity in the Maker Faire, European Researchers' Night Satellite event and Italian Bioeconomy Changemaker Festival-Rome Edition. Depending on the local situation and logistics, a subset of the full collection of bio-based products can be put on display e.g. products related to a certain theme or topic.

Figure 10 - Bioeconomy Village at the Italian Changemakers Festival - Rome edition with the GenB Ambassadors.

In **Slovakia**, Bioeconomy Village was used in combination with other formats, e.g. the hands-on labs in the living-lab activities (see section 3.1). Besides those mentioned in the referenced section, 2 more workshops were organised (2 workshops targeting the age group 15-19, one in Bratislava, and one in Žilina). The Village was a part of shorter events and was a valuable element. For young people, for whom the bioeconomy was a new concept, it represented

something graspable that helped to clarify the theory, but also to move on to more complex topics.

Across Europe, Bioeconomy Villages were organised in the context of "green" large-scale events, for example in science (European Researchers' Night in Italy), sustainable innovation (Planetiers in Portugal), circular economy (Circular Summit in Slovakia) or community-oriented learning in general (Maker Faire in Italy).

The duration of a Bioeconomy Villages is usually between one and three days.

Second Reporting Period (since May 2024)

In **Italy**, APRE implemented the Bioeconomy Village at the European Researchers' Night in September 2024 in Rome. In October 2024, the Italian GenB Ambassador Cristian, with the support of the FVA team, organised the Engine Your Mind Hackathon in Frosinone, leveraging his involvement as part of the Engine4You APS. In this context, as part of the exhibition connected to the event, Cristian organised the Bioeconomy Village.

To engage with many young people and to pilot a series of newly developed educational formats, BTG participated in three festivals in **The Netherlands**: Expeditie Next (Zutphen, 1 May 2024), European Researchers' Night (Groningen, 27 September 2024) and Kleer'NZooi XXL (Groningen, 5 October 2024). Materials presented at these festivals included: three new hands-on experiments, the green chat quartet, the activity booklet, three large posters depicting innovative biobased products, a bio-based product exhibition and the GenB role-playing game card (Figure 11). At each of the festivals, a tailored selection of educational and informative materials was applied, mainly depending on the space available.

Figure 11 – Activities at the Expeditie Next festival in Zutphen, the Netherlands.

In **Portugal**, on the 4th of June 2024, LOBA organised the Bioeconomy Village format together with hands-on activities with the students at Schoolé in Matosinhos, showcasing materials like corn-based plates and algae-derived phone cases. On 15 and 16 May 2024, LOBA introduced

bioeconomy and circularity to students at Bandeira Elementary School in Gaia through the Bioeconomy Village and hands-on sessions. The event left students inspired and excited about sustainability, reinforcing GenB's mission to empower the next generation.

Additionally, the Bioeconomy Village will be also showcased during the GenB&BioBeo Final Event which will be held in April in Brussels.

Table 8 gives a short overview of the Bioeconomy Villages showings organised.

Partner	Country	Venue(s)	Date(s)	Context
HSPN	Greece	Athens	16-21 Apr 2024	Athens Science Festival
APRE	Italy	Rome	Mar 2023	Classrooms at ICG
		Rome	May 2023	Sustainability Day at ICG
		Rome	Sep 2024	European Researchers' Night
APRE FVA	Italy	Rome	Oct 2023	Maker Faire
		Frascati	Sep 2023	European Researchers' Night
		Rome	Mar 2024	Satellite event Bioeconomy Changemaker Festival
FVA	Italy	Frascati	Sep 2024	European Researchers' Night
		Frosinone	Oct 2024	Engine Your Mind Hackathon (FVA provided support to a GenB Ambassador who autonomously implemented this activity)
BTG	Netherlands	Zutphen	1 May 2024	Festival Expeditie Next (outdoor kids' science festival)
		Groningen	27 Sep 2024	European Researchers' Night 2024 Groningen edition
		Groningen	5 Oct 2024	Kleer'NZooi XXL
LOBA	Portugal	Aveiro	Oct 2023	Open event at Planetiers
		Aveiro	14 Mar 2024	Satellite event Bioeconomy Changemakers Festival
		Matosinhos	May 2024	Workshops in classrooms
		Gaia	June 2024	Workshops in classrooms
PEDAL	Slovakia	Bratislava	Since Mar 2023	Workshops in classrooms
		Žilina	Since Mar 2023	Workshop
		Nitra	Since Mar 2023	Satellite event Bioeconomy Changemakers Festival

Table 8 - WP2 format 2.1b: "Bioeconomy village" at large-scale events - showings organised.

Table 9 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	4
Countries with implementation (largely) completed	5
Countries with ongoing or planned implementation	0
Events implemented	19
Participants engaged	Ca. 20.000 (including 4.620 (FVA) and 15.000 (HSPN) in IT, 685 in NL, 500 in PT and 589 in SK)
Targets to be engaged	40.000 people

Table 9 - WP2 format 2.1b: Bioeconomy village at large scale events - impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that **implementation of this task has not been completed**. During the Final Event in Brussels, the GenB partners will implement this activity as well. This might help reaching the KPI.

3.2.3 Main lessons learned

The exposition of bio-based products has proven to be an effective format, on the one hand, to attract visitors (from children to families) at large-scale events, curious to know what the exposition is about, on the other, as a complementary activity to provide participants with a tangible idea and memory of the potential benefits and concrete implementation of the bioeconomy. Learning what the sustainable and circular bioeconomy is, followed by being able to touch and experience concrete bio-based products, keeps a high engagement and overall understanding of students throughout the activities.

The Bioeconomy Village format shall preferably be used in combination with other interactive formats and activities (e.g., the hands-on experiments, discussed in section 3.1, providing students with immediate information and tangible materials they can refer to when learning about the bioeconomy). The bio-based product collection, a legacy of GenB predecessor projects, has proven to be a great tool for increasing the interest of visitors of all ages in further activities. Products from non-traditional or innovative biomass sources (e.g. elephant dung) help raise the curiosity of participants. Therefore, it is strongly recommended to ensure the presentation of such items in the partners' activities.

In addition, it is advised to have a collection of items produced and/or available in their country or even region. This way it is possible to show how bioeconomy can inspire the adoption of sustainable lifestyle.

3.3 Inside the bioeconomy experiential exhibitions (T2.1c)

3.3.1 Concept of the format/activity and prior experience

Concept: Organisation of an exhibition that inspires and inform children and young people on bioeconomy by attracting their interest, raising awareness, and stimulating curiosity and discussion. This format brings inspirational real-life examples of the bioeconomy and of bio-based products (e.g. for use in every day's life applications) to the public space, enabling the visitors to touch and feel the bioeconomy.

Inspirational previous experience: The concept of exhibiting bio-based products is not new and has been applied in various earlier EU projects, also by members of the GenB consortium. An exhibition targeting children and young people, where bioeconomy is "injected" into a larger setting in a public space, other than a school or a large-scale event, and that last longer than a few days, is much less common, and something GenB seeks to help pioneer across Europe.

The idea of the experiential exhibition was to conceptualise and implement a format that does not only build on the legacy of earlier EU-funded bioeconomy awareness raising projects but went beyond what is already available. The purpose of the experiential exhibition, however, was very much alike i.e. to immerse children and young people in the interesting world of bioeconomy to increase their knowledge about bio-based processes, materials, and innovative applications.

The aim was to implement the exhibition, and to inject bioeconomy, in a public space (such as science centre/exhibition, library, city hall, community centre, etc.), other than a school or a large-scale event. Depending on the context, the experiential exhibition was focused on specific themes/topics. Typically, the exhibition was on display for several weeks or months.

Target groups include pre/early students (4-8 years old), elementary school students (9-13 years old), secondary school students (14-19 years old), their families and multipliers.

3.3.2 Activities implemented

Activity	Target	What for	KPI	Target Countries
Inside the bioeconomy experiential exhibit		Bio-based experiential exhibit in existing public spaces	#4.000 people	NL, PT, ES, EU

Table 10 - WP2 format 2.1c: Inside the bioeconomy experiential exhibitions - key characteristics.

First Reporting Period (until April 2024)

In **The Netherlands**, BTG developed a close collaboration with the educational museum Museon-Omniversum in The Hague. Central element in the collaboration is the joint development of a circular, bio-based exhibition, that will become part of the permanent exposition at this museum. Some sensitive objects will be displayed for viewing only, whereas other exhibits can be smelt, touched, etc.

BTG supports MUSEON as a technical expert and helps identify relevant types of biomass feedstock, objects, and candidate product suppliers. BTG also provides background/technical information, which the team at MUSEON uses as a base for public-friendly communication materials. Linked with the exhibits collection, BTG is developing a quartet game targeting the age group 13-18 years old. The development of the exhibition is in progress.

In a **Pan-European** setting, considering the target group and beneficiaries of EUN activities, the experiential exhibition was organised in accordance with the available resources and capacities, enriching the experience gained in GenB with the experiential exhibition concept. EUN has implemented the activity as an online exhibition of bioeconomy-related educational activities compiled during the 2024 STEM Discovery Campaign, between the 1st of February and 30 April 2024. The activities varied in format and ranged from new materials developed, to activities implemented or attended by the participants of the 2024 SDC. 208 bioeconomy activities were submitted by the 2024 SDC participants and were seen by 4700 viewers.

Second Reporting Period (since May 2024)

In **The Netherlands**, a key outcome of the collaboration of BTG with the educational museum Museon-Omniversum was the finalisation and formal opening of the Mighty Materials plaza on the lower floor of the museum on 13 November 2024. The Mighty Materials plaza focuses on a circular (bio)economy and helps to find answers to questions such as: *What is waste? How do we ensure that we make minimal use of newly extracted raw materials and produce minimal amounts of waste?* Bio-based materials exhibited include, amongst others, mango and orange peel, hemp fibre and mycelium. The exhibit will be on display for several years.

In the context of the collaboration with Museon-Omniversum, BTG developed the Green Chat Quartet, a card game for kids highlighting 12 biomass types and their applications, and an activity booklet targeting kids 5-8 y.o. that offers a variety of interactive exercises such as colouring pages, puzzles, mazes, and rebus challenges. The Green Chat Quartet is available for sale at the museum shop. The activity booklet will be distributed through the museum's network with primary schools.

In **Portugal**, in November and December 2024, nine (9) hands-on sessions were organised at primary schools in the Gaia district.

In **Spain**, AIJU conducted a total of 22 workshops as part of its ToyLab Experience, welcoming school visits during the morning sessions and families in the afternoon. These activities took place between June 2024 and February 2025. The Inside Bioeconomy Experiential Exhibition organised by AIJU was structured around three main activities: (1) Bio-Based Experiments; (2) Bio-Based Product Showcase and (3) BioArt Gallery. Appendix 3: *Extra information for activities implemented in Spain* describes these activities in more detail. In addition to the Bio-Based Product Showcase (an extensive collection of bio-based products), AIJU designed a gamified activity called "*EcoMemory: Discover Bio-Based Materials*" (Figure 12). This interactive game challenged children to identify the raw materials used in various bio-based products. The aim of

this activity was to enhance learning through a fun and dynamic approach, reinforcing key bioeconomy concepts.

Appendix 3: Extra information for activities implemented in SpainFigure 12

Figure 12 – EcoMemory: Discover bio-based materials game, designed and played in Spain.

Table 11 gives a short overview of the experiential exhibitions organised.

Partner	Country	Venue(s)	Date(s)	Context
BTG	Netherlands	The Hague	13 Nov 2024 – ongoing	(Permanent) Museum exhibition at Museon
LOBA	Portugal	Gaia	Nov-Dec 2024	"1º ciclo" schools of the municipality of Gaia
AIJU	Spain	Valencia	Jun 2024 – Feb 2025	AIJU ToyLab Experience
EUN	Pan-European	Various	Feb – Apr 2024	2024 SDC

Table 11 - WP2 format 2.1c: Inside the bioeconomy experiential exhibitions – events organised.

Table 12 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	4
Countries with implementation (largely) completed	3
Countries with ongoing or planned implementation	1 (NL: ongoing museum exhibition)
Events implemented	>33

Participants engaged	> 15.000 (including 10.000 in NL, 1200 in PT, 1.132 in ES and 4700 in EU).
Targets to be engaged	4.000 people

Table 12 - WP2 format 2.1c: Inside the bioeconomy experiential exhibitions – impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that the **implementation of this task is completed** and the KPI is achieved.

3.3.3 Main lessons learned

Enhancing engagement through gamification. Transforming a static "Bio-Based product showcase" into an interactive game significantly increased children's interest and engagement. Initially, bio-based products were displayed with labels indicating their raw materials but simply observing them did not fully capture the children's attention. By integrating a game ("EcoMemory: Discover Bio-Based Materials") where participants identified the materials through a playful challenge, the learning experience became more dynamic and immersive. Children actively explored the products, discussed their characteristics, and developed a deeper understanding of bio-based materials. Students showed great interest in smelling and touching the products presented, although some materials, such as the leaves made from excrement, initially caused some reluctance. Teachers also actively participated in the activity. This shift from passive observation to active participation highlights the importance of gamification in educational settings, demonstrating that interactive experiences are more effective in fostering curiosity and retention of key concepts. For future implementations of the "Inside the bioeconomy experimental exhibition", it is recommended to expand the range of products, incorporating those that are particularly intriguing (e.g., paper made from animal excrement) to capture participants' attention, enhance knowledge retention, and increase the likelihood of them sharing what they have learned.

3.4 BioArt Gallery at large-scale events (T2.1d)

3.4.1 Concept of the format/activity and prior experience

Concept: BioArt Gallery is a visually impressive presentation (large-size pictures, stand-alone cardboard panels or roll-up banner) of biomass sources and their applications. It contains information on traditional and well-known, but also new and promising biomass sources and presents examples of their tried and tested as well as innovative uses in products that are part of our lives – such as agriculture products, cosmetics and nutraceuticals, construction and restoration, cleaning and hygiene; design and clothing; toys and sporting goods.

These materials can be used separately as an exhibition showcasing to the public some examples of bio-based products and applications currently available in the market. However, it is well combined with other formats and activities. The original BioArt Gallery consisted of 16 thematic

compositions of large-size pictures (64 panels in total), covering all bioeconomy sectors. In the next steps, it was extended and currently included an additional 27 roll-up banners, presenting different types of biomass feedstock and its applications. An interactive online version is also available. This allows the event organiser to select the materials that are most thematically related to the theme of the event.

Inspirational previous experiences: Similarly, as the Bioeconomy Village, the BioArt Gallery has been tested and exhibited in more than 50 different events, reaching 200,000 people before the GenB project.

As mentioned above, it is a flexible format and is a well-combinable format. It can be presented as a solo exhibition. At the same time, the Gallery is a quality supporting material for various types of presentations, when the visual material complements the presented topic. For example, during the Transition2BIO project, it was often used in combination with the Bioeconomy Village, educational games and quizzes or activities, such as the hands-on labs.

3.4.2 Activities implemented

The BioArt Gallery consisted of an exhibition of thematic compositions of large-size pictures and roll-up banners related to the bioeconomy. The BioArt Gallery was a powerful tool to attract interest, raise social awareness, inspire, and stimulate curiosity and discussion, e.g. among children and adolescents.

The roll-up banners were available in various language versions from earlier EU-funded projects. The collection of banners was originally developed in the BioVoices projects and subsequently expanded in the Transition2Bio project. The current collection of roll-up banners consists of 16 thematic compositions of large pictures (64 panels in total) with high visual impact covering all bioeconomy sectors. An online version of the BioArt Gallery is also available (in English).

For use in the GenB project, GenB partners selected the large-size images and roll-up banners that are likely to attract the most interest among children and translated and printed them. This involved designing and developing roll-up banners covering additional bio-based feedstocks/products.

For maximum impact, the roll-up banners can be applied in combination with other Task 2.1 formats, particularly the hands-on labs (sub-task T2.1a, discussed above) and the Bioeconomy Village (sub-task T2.1b, also discussed above). The roll-up banners serve to inform all GenB target groups but primarily target elementary school students (9-13 years old), high school students (14-19 years old), their teachers and other multipliers.

Activity	Target	What for	KPI	Target Countries

BioArt Gallery (in 9 languages)		Formats (large pictures; roll-ups) promoting bioeconomy in the context of large-scale events	#40.000 people	AT, BE, EL, IT, NL, PT, SK, ES, EU

Table 13 - WP2 format 2.1d: "BioArt Gallery" at large scale events - key characteristics.

First Reporting Period (until April 2024)

ZSI participated at the **Austrian** Bioeconomy Summit on 7 November 2023, where the participants had the opportunity to explore the BioArt gallery online. Furthermore, ZSI gave the participants of the GenB Living Lab with 14-19-year-olds the opportunity to go through the BioArt Gallery on their devices.

The BioArt Gallery has been implemented in **Greece** numerous times by Q-PLAN and HSPN. Specifically, Q-PLAN has incorporated the BioArt Gallery in two WP2 concepts: T2.1a "hands-on lab" organised for students aged 11-12 and T2.2c "bioeconomy career info days" organised in the context of bioeconomy Changemaker Festival –Thessaloniki Edition (March 2024) that engaged older students (mostly undergraduates 18-19 years old) and other ecosystem actors from education, business, academia, NGOs, and the public sector. Future implementations of the BioArt Gallery will be explored in large-scale events to maximise the impact of this activity (e.g. Researchers' Night 2024, Green Wave Expo, etc.). HSPN has implemented the BioArt Gallery within the context of the ForwardGreen Expo in March 2024 (a large-scale event) in Thessaloniki in collaboration with the Green Key Greece Programme of the FEE, with Q-PLAN's support. The event was addressed to bioeconomy and circular economy industry entrepreneurs and professionals. The roll-up poster presented alternative product ideas deriving from insects. Furthermore, the format was implemented during an educational and informational visit to the Mediterranean College of Athens School of Tourism and Hospitality, where the GenB Ambassadors action was presented to the students and teachers, and it is planned to be implemented during 4 more visits to Tourism schools in several areas of Greece throughout April 2024. The roll-up poster presented the importance and proposed biomass usage for *Posidonia oceanica*. The BioArt Gallery was also exhibited during the HSPN's participation in the Athens Science Festival along with Bioeconomy Village and specifically the translated rollups on insects and agricultural and food processing waste, which attracted the interest of many visitors.



Figure 13 - Exhibition of BioArt Gallery in Greek events: hands-on lab (left), ForwardGreen Expo (middle), Career Info Day (right).

In **Italy**, APRE implemented the BioArt Gallery in the I.C Guicciardini school Rome (primary and elementary level), displaying the gallery in the school for 4 months and in the occasion of the open day "Sustainability Day" (May 2023) engaging more than 500 people. In addition, BioArt Gallery has been replicated in Assobiotec and Cluster Spring (Bioeconomy Day) leading multipliers in a step-by-step educational pathways towards the gaining of the main concepts of the bioeconomy. In addition, APRE and FVA jointly implemented the BioArt Gallery in the context of the Italian Bioeconomy Changemakers Festival – Rome Edition, which was organised at Spazio Europa, showcasing many thematic panels covering all sectors of the bioeconomy both in the plenary room and in the exhibition areas. The exhibition engaged around 90 high school students and teachers.

In **Portugal**, LOBA used the BioArt gallery in the National Consumer Meeting at the Parque Biológico de Gaia (March 2023) and large-scale event such as Planetiers World Gathering (October 2023) as complementary activity to the Bioeconomy Village: once participants were informed about what the exposed bio-based products were, the most interested ones willing to know more about biological feedstocks and the potential bio-based products that can be produced from them could get valuable information from the Gallery.

In **Slovakia**, BioArt Gallery was used in combination with hands-on labs activities (see hands-on labs), as a part of the (i) living lab activity, (ii) workshops in events, such as the Earth Day or a workshop organised by the Žilina region, (iii) during the Bioeconomy Changemakers Festival, Nitra edition. In addition to that, the BioArt Gallery was also presented in the first Circular Summit in Slovakia (February 2024), complemented by product samples of the members of the Circular Slovakia platform, reaching an audience consisting of SMEs, researchers, policy makers, civil society.

Figure 14 - Exhibition of BioArt Gallery at Italian Bioeconomy Changemakers Festival – Rome Edition (left) and BioArt Gallery in the Bioeconomy Changemakers in Slovakia (right).

In a **pan-European context**, since EUN only works with teachers and educators, in their case the BioArt Gallery was organised slightly differently, enriching the experience gained in GenB with the BioArt Gallery concept. EUN has implemented the activity as one of the streams of the Scientix-Bioeconomy Award in the context of the 2024 SDC, between 1 February and 30 April 2024. Participants were instructed to develop a BioArt Gallery related to the bioeconomy and feature it in their school or community. Teachers and educators were free to decide on the format, location and what would be included in the gallery display, whilst EUN provided them with materials and guidelines within the information about the Award. A virtual BioArt Gallery was created by 21 participants (one teacher and 20 students) on spatial.io. This gallery consisted of posters highlighting various companies with different bio/sustainable products and the process. For example, in one poster, participants describe what the Ecovative company is about and how it provides sustainable alternatives to plastics. The gallery was seen by 45 viewers.

Second Reporting Period (since May 2024)

In **Austria**, some posters from the BioArtGallery e.g. elephant dung, apple peels and coffee were exhibited at the GenB stand at the European Researchers'' Night 2024. To accompany the posters, a wide range of bio-based products were also exhibited at the stand including e.g. the poo paper and the coffee notebook that can be derived from the resources presented in the posters. The participants also had the opportunity to go through the online laptop provided at the stand.

In **Greece**, in the second Period, there was no physical BioArt Gallery, but the Gallery was "exposed" as a background of the multiplier webinar (T.2.5) engaging non-typical educators and other multipliers with GenB toolkit and experiments. Since the webinar was hybrid, Q-PLAN set up a studio to conduct the webinar using the BioArt Gallery. As an upcoming event, the BioArt Gallery is planned to be exposed in the 'Forward Green 2025' (FG Expo) trade show and conference, organised 13-15 March 2025 in Thessaloniki, Greece. Forward Green is designed to foster a fresh entrepreneurial mindset in Greece and it centres on promoting a circular economy, bioeconomy and sustainable development. Q-PLAN will present the BioArt Gallery in its pavilion expecting to be seen by many locals or international exhibitors and visitors of the Expo. Alongside, Q-PLAN will offer GenB gadgets (pens, bottles, t-shirts etc) to interested visitors. The FG Expo International Exhibition is addressed to companies, agencies, organisations, and governmental agents that are adopting modern practices for the utilisation of raw materials, construction materials, technologies, recycling, and packaging, which, through innovative solutions and smart partnerships, will have a positive impact on the reduction of environmental impact, increasing the sustainability of products and services, while also creating new business opportunities.

In **Italy**, the BioArt Gallery was implemented in the context of the EU Researchers' Night organised in Frascati on 27 September 2024. In this context, the informative panels raised curiosity and interest, stimulating visitors to pose questions to the GenB Ambassadors who were

managing the GenB booth, and implementing several raising-awareness and educational activities. Additionally, in October 2024, the Italian GenB Ambassador Cristian, with the support of the FVA team, organised the BioArt Gallery exhibition in the context of the **Engine Your Mind Hackathon** in Frosinone.

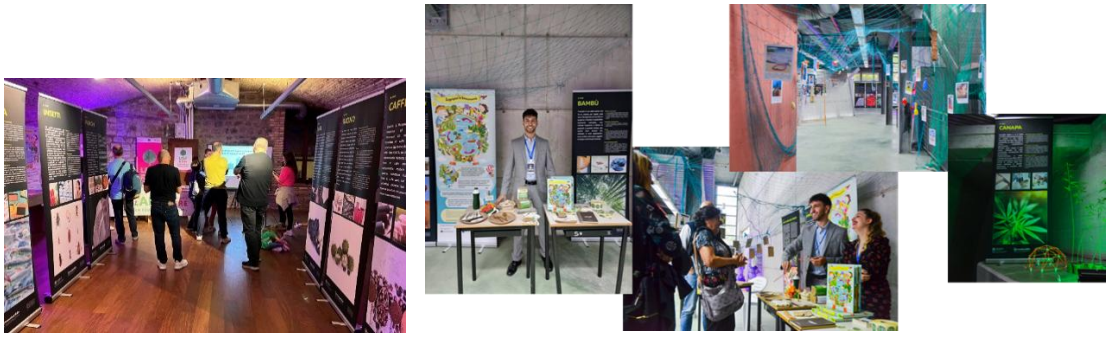


Figure 15 - BioArt Gallery at the EU Researchers' Night 2024 (left) and BioArt Gallery at the Engine Your Mind Hackathon (right).

In **The Netherlands**, Dutch-language BioArt Gallery posters, showcasing elephant dung, apple peels and coffee (same selection as used in Austria) were exhibited at the GenB stand at the festivals BTG participated in (Expeditie Next, European Researchers' Night, and Kleer'NZooi XXL – see before). To accompany the posters, selected bio-based products were also exhibited. The same was also exhibited during the study visits "A Day in a biorefinery" (Task 2.2d).

In **the pan-European context**, BioArt gallery has been implemented in collaboration with Scientix in February 2025, as an online video segment of Scientix TV. An online version of BioArt Gallery with posters of different materials used to create bio-based products, such as orange, apple and tomato peels and bamboo and coffee was exhibited during the video. The segment was shared on Scientix and STEM Alliance social media channels and has reached a wide international audience.

In **Spain**, the BioArt Gallery has been showcased at several venues, including the AIJU ToyLab Experience, the Science Park of Miguel Hernández University, the Valencian Toy Museum, and various school activities. At the AIJU ToyLab Experience, the BioArt Gallery was an integral part of the Inside Bioeconomy Experiential Exhibition, where children aged 6 to 12, along with teachers, parents, and grandparents, interacted with the display.

Beyond this context, the gallery was accessible to a diverse range of visitors like school groups and public authorities. During these tours, it was explained that one of ToyLab's missions is to convey societal values and raise awareness, as exemplified by the GenB project through the BioArt Gallery. Notably, Mr. Juan José Cortés Vélez, Director-General of Innovation at the Department of Innovation, Industry, Commerce and Tourism, was introduced to the GenB project, and specifically to the BioArt Gallery. The gallery was also exhibited at the Science Park of Miguel Hernández University—a centre for innovation and knowledge transfer that fosters collaboration between the university, businesses, and institutions. Finally, the exhibition is currently on display at the Valencian Toy Museum, accompanying an exhibit of bio-based toys

selected by AIJU. Figure 16 illustrates the various locations where the BioArt Gallery has been presented.

Figure 16 – Different moment during visits to the BioArt Gallery in Spain.

The BioArt Gallery will be showcased during the GenB&BioBeo Final event which will be held on 10 April 2025 in Brussels in order to engage and reach a wider audience with this exhibition. The Partners are considering whether to showcase the physical or online version of the output.

Table 14 gives a short overview of the BioArt Gallery showings organised.

Partner	Country	Venue(s)	Date(s)	Context
ZSI	Austria	Graz	27 Sep 2024	European Researchers' Night 2024 Graz edition
ZSI	Austria	Vienna	7 Nov 2023	Bioeconomy Summit, National event
		Vienna	19 Apr 2023	Classroom
HSPN	Greece	Thessaloniki	7-9 Mar 2024	Large-scale event at Green Key Greece (FEE)
		Athens	21 Mar 2024	BCA College Greece
		Rhodes	4 Apr 2024	Informational visit at ASTER
		Crete	14-15 Apr 2024	Informational visit at ASTEK

		Athens	16-21 Apr 2024	Athens Science Festival
Q-PLAN	Greece	Thessaloniki	28 Nov 2023	1st Junior High school Kalamaria
		Thessaloniki	14 Mar 2024	OK!Thess as a parallel session of Bioeconomy Changemaker Festival-Thessaloniki Edition
		Thessaloniki-online	28 Nov 2024	Studio set up for multipliers webinar (T2.5)
APRE	Italy	Rome	25 May 2023	Assobiotec and Cluster Spring (Bioeconomy Day)
		Rome	31 May 2023	Sustainability Day 2023 at ICG
		Rome	Feb – Mar 2023	IC Guicciardini school (Rome)
		Brussels	10 Apr 2025	GenB&BioBeo Final Event
FVA and APRE	Italy	Rome	14 Mar 2024	Satellite event Bioeconomy Changemakers Festival
FVA	Italy	Frascati	27 Sept 2024	European Researchers' Night 2024
		Frosinone	Oct 2024	Engine Your Mind Hackathon (FVA provided support to a GenB Ambassador who autonomously implemented this activity)
BTG	Netherlands	Zutphen	1 May 2024	Festival Expeditie Next (outdoor kids' science festival)
		Groningen	27 Sep 2024	European Researchers' Night Groningen edition
		Groningen	5 Oct 2024	Kleer'nZooi XXL
LOBA	Portugal	Aveiro	Mar 2023	National event Planetiers
		Aveiro	Oct 2023	National consume day at University of Aveiro
PEDAL	Slovakia	Bratislava	All the time	Leisure centre Žilina (x4)
		Žilina	Mar 2023	Žilina Self-governing region
		Bratislava	Feb 2024	Circular Summit Slovakia
		Nitra	Mar 2024	Satellite event BCF
AIJU	Spain	Alicante	SY 2023-2024 & SY 2024-2025	AIJU ToyLab Experience; Science Park from Miguel Hernández University; Valencian Toy Museum; activities at schools.
EUN	Pan-European	Various	Feb-Apr 2024	2024 SDC
		Online	February 2025	Scientix TV segment

Table 14 - WP2 format 2.1d: BioArt Gallery at large-scale events- showings organised.

Table 15 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	8
Countries with implementation (largely) completed	7
Countries with ongoing or planned implementation	2 (Final Event in Brussels and 'Forward Green 2025' FG Expo in Greece)
Events implemented	31
Participants engaged	Ca. 26.000 (including 868 in AT; 17.473 in EL, 2.890 in IT; 685 in NL, 565 in PT, 589 in SK, 2.500 in ES and 618 Pan-European)
Targets to be engaged	40.000 people

Table 15 -WP2 format 2.1d: BioArt Gallery at large scale events - impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that **implementation of this task has not been completed**. Several GenB partners foresee implementing additional events, for example during the GenB&BioBEO Final Event in Brussels (10 Apr 2025). This will help reaching the KPI.

3.4.3 Main lessons learned

Good attention drawer and conversation starter: The BioArt Gallery creates an atmosphere and tunes visitors to the topic of bioeconomy. The Gallery presents scientific and economic concepts in a way that is attractive and friendly to viewers from all types of audiences. The infographics (roll-ups) attract the attention of young students and experienced professionals alike. The roll-up banners can be very effective and attention-grabbing when used within the context of other WP2 activities. Event visitors can stop by and explore the content of the materials.

- This was illustrated in Greece where during the Forward Green Expo, professionals from circular economy sectors were engaged in discussing alternative uses of non-conventional biomass (e.g. protein from insects). Furthermore, the 1st year students at the Mediterranean College were impressed by the possible uses of the *Posidonia oceanica* biomass. This roll-up poster was specifically selected for the target audience, as Tourism as a sector is closely related to management approaches for *P. oceanica* in tourist coastal areas. The use of impressive photos and infographics combined with the compact presentation of elaborate concepts can be engaging for diverse audiences.
- At the IBCF Rome edition, the thematic panels covering all sectors of the bioeconomy provided first knowledge about bio-based products and circular bioeconomy. The information presented in the Gallery helped teachers and students to understand the discussion held during the satellite event's conference.

Very flexible and suitable for both larger and smaller events. The Gallery works well at larger events, as explained above, where they can serve as an indicator of actual attendees'

engagement, who usually start discussions with other participants and the organisers. The Gallery can also be used for smaller and more structured activities, such as during classroom workshops.

When working with younger participants in activities, it is recommended to only with the images, rather than with full roll-up banners. The content of latter is harder to understand for lower age categories. It is advisable to create simpler posters for these groups.

The BioArt Gallery format is more effective when paired with other formats (e.g., T2.1a – Hands-on experiments and T2.1b - Bioeconomy Village) by providing further information and concrete examples to participants.

Especially for the younger audience, the elephant dung roll-up paired up by the poo paper is a great attraction especially for younger groups. They are drawn to the exhibition stand by the elephant dung roll-up because of the picture and colours and become even more eager to learn about bioeconomy and other possibilities for bio-based products once they can see, touch and smell the "poo paper". In general, having the different roll-ups and examples of products that can be created from the resource sparks interesting and makes the learning easier to digest. As an example, for the GenB stand at the Graz edition of the European Researchers' night, the elephant dung roll-up was displayed, accompanied by the poo paper as well as the coffee roll-up accompanied by the GenB coffee notebooks.

For younger children, especially those who are not yet able to read, the BioArt Gallery should be transformed into a more visual content, using images and graphics that facilitate understanding without the need for extensive text. The information should be presented in a more elementary way, with a focus on visuals and intuition to capture their attention. Additionally, it would be interesting to select raw materials and product transformations that are more surprising, such as using elephant dung to make paper. With these curiosities, we can attract a younger audience while increasing the likelihood that the knowledge will be retained.

Moreover, it has been observed that the vertical design of the posters, while suitable for an adult audience, is not as functional for young people who can already read but are still not tall enough to comfortably access the upper parts of the posters. This hampered their experience, as they had trouble reading or seeing the images located at the top of the posters. Therefore, a recommendation would be to adapt the poster format to ensure better visibility and accessibility for all age groups.

3.5 Participatory photography

3.5.1 Concept of the format/activity and prior experience

APRE is developing a new format named "***art and expressive means to convey science-related contents to youngsters and bring citizens closer to science"*** in which different types of

educational activities have been gathered, using arts and expressive means to convey bioeconomy concepts to young people.

This activity foresees the use of participatory photographs and videos to involve students and their parents with the aim to reflect and raise awareness about bioeconomy applications in daily contexts. This format is developed as an educational factsheet and has been included in the GenB toolkits (see D.1.3 for details on the content).

Participatory photography can be used to engage youth and families on the opportunities of circular bioeconomy in their everyday context. The bioeconomy covers both traditional, artisanal products that sometimes have been around for centuries as well as innovative products that are made using the latest biotechnology. Through photographs (and/or video recordings), young people become aware of the numerous and concrete applications of the bioeconomy, collecting virtuous examples existing in their everyday contexts, and stimulating sustainable choices through a critical and conscious gaze. In addition, through this format, young people (primary education classes) take photographs together with their families, who are actively involved as key players in lifelong learning. Older children (middle and high school students) can take photographs and videos by themselves.

3.5.2 Activities implemented

First Reporting Period (until April 2024)

In the Living Lab that APRE organised in 2023 this format was used in the primary class of I.C Guicciardini Roma as a homework activity suggested to the teacher to deepen the bioeconomy concepts learnt in the classrooms.

Figure 17 - Photos taken by 4th graders of IC Guicciardini Elementary School, Rome (2023).

Second Reporting Period (since May 2024)

In **Italy**, this participatory photography format has been an inspiration for the Art Competition, developed by FVA.

In **Slovakia**, the format was recommended to various teachers and multipliers as part of the toolkit.

Performance vis-à-vis KPIs

This is an additional format not foreseen/promised in the project proposal or the GA. There is no KPI to be met. It was piloted by APRE.

3.5.3 Main lessons learned

The children and teachers really enjoyed the format as they had fun discovering natural bioeconomy products in their own neighbourhood. It is a simple, creative, and participatory homework activity that teachers can give to their students to consolidate their knowledge and express their perspective, but also a way to involve their parents in the activity. The format can be easily replicated, expanded and used with different age groups, from very young kids to young adults.

4. Inspire and inform students in bioeconomy careers

Task 2.2 "*Inspire and inform students in bioeconomy careers*" experiments activities to attract new generations to bioeconomy-related careers through the following formats and activities:

- Task 2.2a: Role-playing game on bioeconomy jobs in schools
- Task 2.2b: TEDx pitches
- Task 2.2c: Bioeconomy careers info days
- Task 2.2d: A Day in a biorefinery study visit
- Task 2.2e: Schools' projects to grow future entrepreneurs

Table 16 presents an overview of the Task 2.2 formats/activities to inspire and inform students in bioeconomy careers, the countries where activities were implemented, and the associated Key Performance Indicators (KPIs).

Activity	Target	What for	KPI	Target Countries
Role-playing game on bioeconomy jobs in schools		Game to become more familiar with different professions in the bioeconomy (circular farmers, biotech researchers, etc.)	#150 students	EL, ES, EU
TEDx pitches		Storytelling on bioeconomy applications, risks, and benefits, involving GenB ambassadors as testimonials	#240 students	IT, SK, EU
Bioeconomy careers info days		Involving researchers and professionals as testimonials	#300 students	EL, IT, SK, EU
A Day in a biorefinery study visit		Open door days in biorefineries and research labs	#100 students	IT, NL, EU
Schools' project to grow future entrepreneurs		To grow future bioeconomy entrepreneurs (e.g. Startupper School Academy) in Italy	#5.000 students	IT

Table 16 -WP2 formats to inspire and inform students in bioeconomy careers.

4.1 Role-playing game on bioeconomy jobs in schools (T2.2a)

4.1.1 Concept of the format/activity and prior experience

The role-playing game on bioeconomy jobs is a fun and educational activity that can be adapted for pre- and early-school children (4-8 years old) to introduce them to the concept of bioeconomy and the various jobs associated with it. It is called *BioHeroes: let's save the planet!* and it is a print-to-play card game. The basic idea of the game is to allow children to role-play as

different bioeconomy professionals and learn about their roles and responsibilities. For example, the game could involve children playing the roles of farmers, biologists, chemists, engineers, or entrepreneurs, all of whom play an important role in the bioeconomy.

4.1.2 Activities implemented

The duration of the role-playing game was up to 2 hours. Target groups in Greece and Spain were early and pre-primary school students from 4 to 8 years old. In the case of EUN, (international primary, secondary and teacher) teachers were the target group.

Activity	Target	What for	KPI	Target Countries
Role-playing game on bioeconomy jobs		Game to become more familiar with different professions in the bioeconomy	#150 students	EL, ES, EU

Table 17 - WP2 format 2.2a: Role-playing game on bioeconomy jobs in schools - key characteristics.

First Reporting Period (until April 2024)

In **Spain**, AIJU implemented the role-play card game on professional profiles in the bioeconomy. AIJU proposed the development of its "print to play" card game on bioeconomy professions in its ToyLab Experience, with a total of 50 students in the second year of primary school, aged 8-9 years old (29 pre- and early-school students from 4-8 y.o. and 21 elementary school students from 9-13 y.o.). The workshops took place on 22 and 25 March 2024 and lasted two hours. Prior to the game, a participatory assembly was held in small groups to reflect on the professions related to the bioeconomy and their tasks. This was followed by at least two game sessions in each of the groups, which consisted of 4 participants (Figure 18).

Figure 18 – Children playing RPG BioHeroes: Let's save the planet!

EUN implemented a first role-playing game (RPG) on 19-20 March 2024 in **Brussels** as part of its teacher training programme "Future Classroom Lab workshop: Supporting STEM Educators:

Innovative Approaches to Teaching and Learning". 23 international primary, secondary and teacher trainers, and a headmaster, participated in a 1.5h training workshop that was split into two parts. The first workshop part focused on introducing teachers to the basic terms and concepts of bioeconomy, available teaching resources and careers in the field, as part of Task 2.3a: Educational activity using the toolkits. The second workshop part was dedicated to the implementation of the RPG. Among the 23 participants were 3 teachers teaching students between the ages of 5 to 11, a target group relevant to this format.

As a stream in the Scientix-Bioeconomy Award within the 2024 STEM Discovery Campaign (1 Feb. – 30 April 2024), EUN provided teachers with guidelines and materials on how to implement the RPG with their students. The materials provided included different career-related materials developed within GenB (i.e. the RPG developed by AIJU, and the Bioeconomy Career Factsheets developed by EUN). Participants were instructed on how to implement the format and report on it by providing a story of implementation. Two international secondary teachers and 64 students participated in this activity.

Second Reporting Period (since May 2024)

In **Greece,** the activity was implemented on 21 February 2025, in the 1st Elementary School of Paiania, a member of the FEE ECO-SCHOOLS environmental education programme operated by the HSPN. The event was paired with the "Reducing my Ecological Footprint at school and at home" activity, organised by the HSPN's Educational Programmes. The activity was based on a practical guide created by the HSPN to help young students, their teachers and parents make more responsible and eco-friendly choices in their everyday lives. The event featured a translated version of the "Bio-Heroes" game (instructions and cards) and was implemented in teams of 6 students at a time in rotation with two selected hands-on activities (Bioplastics from milk and Biogas Factory Balloon) with the participation of a total of 45 6th Grade students. The simple version of the game (for beginners) was used. The gameplay was coordinated by the HSPN's EU Projects and Educational Programmes representatives with the contribution of 3 teachers and the school principal. There was a short feedback session after the end of the gameplay.

In **The Netherlands**, BTG took the opportunity of its participation in the Expeditie Next festival in Zutphen (see Task 2.1a) to pilot the role-playing game. This was not a big success. The setting (an exhibition in open tent) appeared not very conducive for playing this role-playing game, and after less than a few hours, this part of the festival exhibition stand was cleared.

Table 18 gives a short overview of the role-playing games planned by GenB partners.

Partner	Country	Venue(s)	Date(s)	Context
AIJU	Spain	Valencia	22 and 25 March 2024	At AIJU ToyLab Experience

EUN	Pan-European	Various	Feb-Apr 2024	Future Classroom Lab workshop -FCL
		Brussels	July 2024	Scientix and Life Terra project
HSPN	Greece	Paiania	21 Feb 2025	Within HSPN Educational Programmes (Reducing my Ecological Footprint at school and at home, ECO-SCHOOLS)

Table 18 - WP2 format 2.2a: Role-playing game on bioeconomy jobs in schools – events organised.

Table 19 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	3
Countries with implementation (largely) completed	3
Countries with ongoing or planned implementation	0
Events implemented	8
Participants engaged	>150 students and teachers (including 45 students in EL, 125 students in ES, 64 students in EU, 25 teachers in EU and 4 teachers in EL)
Targets to be engaged	150 students

Table 19 – WP2 format 2.2a: Role-playing game on bioeconomy jobs in schools – impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that **the implementation of this task is completed** and the KPI is achieved.

4.1.3 Main lessons learned

Based on the Spanish experience, activities under the principle of "Learning by playing" represent a highly effective educational methodology, which emphasizes active participation, practical experimentation and experiential learning. Valuing play as a fundamental tool for learning, these games not only transmit knowledge and skills but also encourage creativity and problem-solving. By promoting a deeper, lasting understanding of the concepts taught, these dynamic and stimulating learning experiences empower children to understand the importance of the bioeconomy.

On the other hand, additional guidance and clarification of the rules needed to make this format is very appealing for the age group between 4-9 years, as demonstrated by the Pan-European experience. Indeed, the participants indicated that the game would be visually appealing and would keep the attention of students with additional information. Moreover, they suggested

that the role-playing game could be performed in pairs which would foster collaboration and peer-to-peer learning.

4.2 TEDx pitches (T2.2b)

4.2.1 Concept of the format/activity and prior experience

Concept: The goal of TEDx is to inspire a passion for spreading ideas in local communities from within. TEDx pitches represent storytelling formats used to inform and inspire students and other multipliers on bioeconomy applications, risks, and benefits. TEDx talks are a showcase for speakers presenting well-formed ideas in under 18 minutes. This format was proven to be an effective education format because it is based on the direct connection among peers (students). In particular, very young students are keener on learning from other students because they are perceived as inspirational examples, who are close to their age, and experiences and who share the same values.

In GenB TEDx-style pitches were delivered by students to talk about the bioeconomy and bio-based products. This format represents an effective way to directly involve the different categories of GenB ambassadors (i.e. Young Biovoices, Activists, and Frontrunners; see D3.1) by engaging young people. Candidates for giving TEDx pitches were selected from among the GenB Ambassadors community and were empowered through a series of capacity-building webinars in T3.2 to help them in their activities to promote and communicate the circular sustainable bioeconomy. Additionally, a toolkit targeting GenB Ambassadors was made available in close collaboration with T1.4 to further support them.

Inspirational previous experience: The TEDx pitches format was first implemented in the context of Transition2BIO, during the awarding event of the Startupper School Academy school competition. In this event, students were involved, trained, mentored, and supported in delivering a bioeconomy pitch. The format proved to be effective in this and in further experiences because it is based on the direct connection among peers (students). In particular, very young students are keener on learning from other students because they are perceived as inspirational examples, who are close to their age, and experiences and who share the same values. A secondary indirect target of this format is the families because students are the perfect multipliers of sustainability content, greatly contributing to promoting behavioural and attitudinal changes.

4.2.2 Activities implemented

Activity	Target	What for	KPI	Target Countries

TEDx pitches		Storytelling on BE applications, risks, and benefits, involving GenB ambassadors as testimonials	#240 students	IT, SK, EU

Table 20 - WP2 format 2.2b: TEDx pitches - key characteristics.

First Reporting Period (until April 2024)

In Italy, FVA, working with APRE, piloted the activity in the European Researchers' Night held in Frascati on 29-30 September 2023, involving young GenB Ambassadors from 9 to 19 years old. Specifically, the younger children read a tale on the adventurous apple Melania (connecting topics like the importance of valorising residues to produce bio-based products e.g. vegan leather from apple skin), while the oldest children explained to the public about the bioeconomy, delivering a speech with practical examples of bio-based products that were showcased by the younger children (see pictures below). The TEDx was recorded and shared on @BIOVOICES YouTube channel (link).

Figure 19 - GenB Ambassadors performing the TEDx at European Researchers' Night 2023.

After kicking off the format, FVA replicated the activity with 19 years old. Italian GenB Ambassadors, in the context of the Italian Bioeconomy Changemakers Festival – Rome edition on 14 March 2024. In this context, the pitch format was fine-tuned and tailored to be more informative also towards the bioeconomy contribution in addressing the main environmental challenges, as well as to promote new studies and working careers in the domain (see Figure 20).

Figure 20 - GenB Ambassadors performing the TEDx at Italian Bioeconomy Changemaker Festival -Rome edition

In **Slovakia**, the TEDx format was likewise implemented in the context of the Bioeconomy Changemakers Festival – Nitra edition held on 13 March 2024. As part of their TEDx pitches, five (5) young professionals presented various career opportunities in the bioeconomy, with the aim to inform about the variety of careers in the field and to inspire and attract young people to explore and study bioeconomy. Their talks were recorded for future use as testimonials.

Second Reporting Period (since May 2024)

At **pan-European** level, EUN implemented the TEDx format in the context of the 2024 Science Project Workshop, in Brussels held on 6 July 2024. During the event, the GenB Ambassador, Emiliano Barbero, from the Netherlands delivered a TEDx talk to 46 international teachers. Emiliano shared his experience and journey in pursuing bioeconomy, focusing on the importance of the topic and teacher's role in raising awareness and inspiring students to pursue this path and become responsible citizens of tomorrow. The talk aimed to help teachers reflect on the importance of relatability in environmental education.

The TEDx talk was recorded and included in the BIOVOICES YouTube channel.

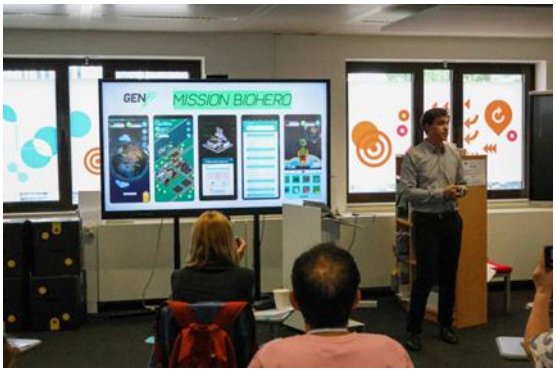


Figure 21 – GenB Ambassador performing the TEDx at the 2024 Science Project Workshop, in Brussels.

Table 21 gives a short overview of the TEDx pitches organised.

Partner	Country	Venue(s)	Date(s)	Context
FVA APRE	Italy	Frascati	29-30 Sep 2023	European Researchers' Night
		Rome	14 Mar 2024	Satellite event Bioeconomy Changemakers Festival
PEDAL	Slovakia	Nitra	13 Mar 2024	Satellite event Bioeconomy Changemakers Festival with GenB Ambassadors

EUN	Pan-European	Brussels	6 July 2024	Scientix and Life Terra project-SPW: Face-to-face event with GenB Ambassador from NL

Table 21 - WP2 format 2.2b: TEDx pitches – events organised.

Table 22 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	3
Countries with implementation (largely) completed	3
Countries with ongoing or planned implementation	0
Events implemented	4
Participants engaged	At least 130 students directly and around 920 indirectly through their teachers (including 110 in IT, 20 in SK, and 46 teachers and 920 students (indirectly) in EU).
Targets to be engaged	240 students

Table 22 - WP2 format 2.2b: TEDx pitches - impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that **the implementation of this task is completed** and the KPI is reached via indirect engagement of students via teachers.

4.2.3 Main lessons learned

For an effective TEDx pitch, a well-structured presentation is needed: begin by engaging the audience with a relatable example, followed by a clear explanation of the idea, supported by evidence and implementation strategies. The conclusion should highlight the potential impact of the topics on the audience. It's advisable to provide support to GenB Ambassadors in refining their TEDx pitches and organise a rehearsal, ensuring they feel confident and supported in conveying complex concepts related to the bioeconomy. This format can be effectively implemented in large-scale events, including those organised by the European Commission and involving younger generations on stage.

Trying out the format in a pilot provided valuable insights on how to finetune the TEDx format to make it even more informative.

Combining the TEDx pitch format with the reading of a fairy tale (as was done during the EU Researchers' Night in Frascati, Italy) appeared very effective in engaging a mixed audience composed of families with kids and teenagers.

The on-stage presence of the GenB Ambassadors of different ages attracted the attention of the public and especially of their peers (e.g. in the Bioeconomy Changemakers Festival in Italy and

Slovakia), representing an innovative approach to transfer these contents compared to having "experts" on stage.

4.3 Bioeconomy careers info days (T2.2c)

4.3.1 Concept of the format/activity and prior experience

In general, a career day is an activity in which business partners from a variety of companies and other organisations come together to share information about their workplace, their job, and the education and skills that are required for success in their careers. The career days can take place at a school, or it can be organised as a dedicated event.

The aim of the GenB bioeconomy career info day was to provide a platform for students and recent graduates and employers to meet each other. The event was an ideal opportunity for students to network and an excellent chance to meet a future employer.

The career info day can target high school students who are about to choose the topic of their study at an academic university, an applied university, or other types of tertiary education. Alternatively, the career info day can target students who are about to graduate and enter the professional labour market. Irrespective of the age group targeted, the idea is that experts working in the bioeconomy field explain different career paths to inspire young people.

4.3.2 Activities implemented

Activity	Target	What for	KPI	Target Countries
Bioeconomy careers info days		Involving researchers and professionals as testimonials	#300 students	EL, IT, SK, EU

Table 23 -WP2 format 2.2c: Bioeconomy careers info days - key characteristics.

First Reporting Period (until April 2024)

In **Greece**, Q-PLAN implemented a bioeconomy career info day focused on young adult professionals and university students (focus on 18-19 years old). The info day entailed an introduction to the status quo of the Greek Bioeconomy ecosystem, followed by the presentation of educational programmes by higher education institutions and storytelling by successful bioeconomy professionals representing diverse career pathways, in agriculture, industry, communication & marketing, urban innovation and a start-up. Young students were informed about entrepreneurship programmes to convert their vision to business ideas, e.g. a university incubator and had the chance to exchange views with the Region of Central Macedonia on policy measures to promote bioeconomy skills and competencies. The BioArt Gallery (see section 3.4) and job profiles developed in the parallel EC-funded BioGov.net project were exhibited at the venue. Four (4) Greek GenB Ambassadors from Thessaloniki attended the event.

Figure 22 - Career info day organisation in Greece.

In **Italy**, APRE, with the support of FVA, implemented a first bioeconomy career info day in Italy in the context of Ecomondo – the Green Technology Expo – in November 2023. During this event, APRE organised a cross-disciplinary and cross-society debate, deepening a policy-oriented vision of the competencies to be developed. Moreover, in Italy, Cluster Spring applied the "Career Talks" format during the Bioeconomy Changemakers Festival (February 2024). Young entrepreneurs and workers in bioeconomy shared their successful stories with students, to inspire and attract them towards green careers. During their pitches, the speakers covered different domains in which the bioeconomy can represent an opportunity for studying and working careers (see Figure 23).

The bioeconomy careers info day format was replicated in local editions in Italy (Rome), Greece (Thessaloniki), and Slovakia (Nitra) of the March 2024 EC Bioeconomy Changemakers Festival, as sketched below.

Figure 23 - Career Talks during the Italian Bioeconomy Changemaker Festival -Rome edition.

In **Slovakia,** the career info day was combined with the TEDx speeches during the Bioeconomy Changemakers Festival, Nitra edition. Five young professionals presented their present careers in the bioeconomy, as well as their educational path, leading to their careers. As the event took place in a research centre focusing mainly on the field of agriculture and food, the participants had the opportunity to also take part in a workshop presenting opportunities for innovations and business, where the young participants had the opportunity to meet researchers, entrepreneurs, and policymakers.

At **pan-European level**, EUN, whose beneficiaries and target group are international teachers and educators, implemented a 1-hour online career chat on 9 April 2024 as part of the 2024 **STEM Discovery Campaign**. The chat was held with a Dutch expert working on sustainable building and transition of Dutch construction sector towards a sustainable and circular economy. Secondary school teachers as well as their classes had a chance to meet the industry expert and learn about career opportunities, skills, knowledge, and personal traits needed to become an expert in bioeconomy in the construction sector.

Second Reporting Period (since May 2024)

In **Slovakia**, PEDAL participated in the Regional Festival of Environmental Organisations "Play for a Green Region" in Žilina on 13 June 2024, where they organised and facilitated multiple activities in collaboration with the Development Agency for the Žilina Region. These included a Bioeconomy Talks workshop focused on inquiry-based learning, where participants explored the principles of bioeconomy and its practical applications. The event also provided a space for discussions on career opportunities in the bioeconomy sector, allowing participants to connect with experts and explore potential future pathways in sustainable industries, bioeconomy included. The participants were mainly high school students aged 14-18 from across the Žilina region.

Table 24 gives a short overview of the career info days organised.

Partner	Country	Venue(s)	Date(s)	Context
Q-PLAN	Greece	Thessaloniki	14 Mar 2024	Satellite event Bioeconomy Changemakers Festival collaborating with BioGov.net
APRE & FVA	Italy	Rimini	10 Nov 2023	ECOMONDO
		Rome	14 Mar 2024	Satellite event Bioeconomy Changemakers Festival
PEDAL	Slovakia	Nitra	13 Mar 2024	Satellite event Bioeconomy Changemakers Festival with GenB Ambassadors

		Žilina	13 Jun 2024	Regional Festival of Environmental Organisations "Play for a Green Region"
EUN	Pan-European	Online	9 Apr 2024	2024 SDC in collaboration with Dutch construction sector expert

Table 24 - WP2 format 2.2c: Bioeconomy careers info days – events organised.

Table 25 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	4
Countries with implementation (largely) completed	4
Countries with ongoing or planned implementation	0
Events implemented	6
Participants engaged	Ca. 195 (including 55 persons in GR (including students, bioeconomy actors, teachers, researchers, NGOs, and policymakers), 120 students, teachers, and tutors in IT, 30 students in SK, 4 teachers and 24 high school students directly in EU)
Targets to be engaged	300 students

Table 25 - WP2 format 2.2c: Bioeconomy careers info days - impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that **the implementation of this task is completed** but the overall KPI has not been achieved successfully.

4.3.3 Main lessons learned

The career info day is a learning opportunity not only for students but also for seasoned professionals who learn how to invite young and future professionals to join through imaginative and practical ways. This is a key element, as a tendency towards introversion is observed within the Greek bioeconomy community (as a niche sector) – evident by the fact that ecosystem actors know each other very well but awareness of the sector is still low among students.

The participation of **young speakers** was more attractive for the audience who empathised more easily with the speakers. Moreover, the speakers used a simple language enriched by practical examples that supported the students to become familiar with the different sectors of green jobs. To keep the attention of the audience, it is good to choose a smaller number (4-5) of speakers, but with different careers/topics.

Younger students were less attentive to some speakers' pitches. Targeting individuals who must choose their study or work pathway (such as students in the final years of high school, young

adults, and early-stage professionals) is more meaningful. There is a higher probability for them to make career choices in sustainable fields in general, and bioeconomy in particular, based on the information received. For instance, a student with a political science background requested information to join the Greek Bioeconomy Council which is currently under formation.

Students need concrete and practical information on bioeconomy career pathways and infrastructure in the region for education and skills–building. Students find it hard to navigate opportunities on their own. Information on the connection of undergraduate studies with bioeconomy is very limited.

Storytelling (career testimonials) and speaker diversity are essential for inspiration and resolving misconceptions, conveying the message that bioeconomy is a broad, interdisciplinary field accessible to anybody and not only professionals in biology, biotechnology, and STEM in general.

The recording of the speaker pitches helps to ensure that the stories can be used further and in other formats.

4.4 A Day in a biorefinery study visit (T2.2d)

4.4.1 Concept of the format/activity and prior experience

Concept: Biorefining is the sustainable processing of biomass into a spectrum of bio-based products and bioenergy. This format aims to inform and attract talent in life science, technology, and bioeconomy opportunities. It involves the organisation of a site visit for a group of students (aged 11 years or older) and their teachers to a commercially operating biorefinery (or other relevant and interesting bioeconomy plant) with its own research facilities, to experience a day as researcher or other professional in the bioeconomy. Elements of a “Day in a Biorefinery” may include: a site tour of the production and the research facilities, an on-site informative workshop, addressing e.g. career opportunities or including a testimonial of a professional working at the biorefinery, and an Information market (to display product samples, information materials, etc.). During the site visit an expert explains the bioprocess and technology of the plant, the activities carried out, and the expertise needed to work in the biorefinery.

Inspirational previous experience: Many industrial plants in the bioeconomy can be visited by the public. Visiting opportunities may be provided almost daily, once a week or month, or only on special occasions. Beer breweries, winemakers and other food processing plants are examples in the first category. Chemical plants that can be visited only during dedicated events (e.g. Open Door days) fit in the last category. Because of safety issues, visiting industrial plants with younger people (e.gl. school classes) can be problematic.

4.4.2 Activities implemented

Activity	Target	What for	KPI	Target Countries

"A Day in a biorefinery" study visit		Open door days in biorefineries and research labs	#100 students	IT, NL, EU

Table 26 - WP2 format 2.2d: "A Day in a biorefinery" study visit - key characteristics.

BTG and APRE searched, identified, contacted, and engaged several chemical plants that produce bio-based products as potential hosts for a study visit. Unfortunately, almost all pre-identified, relevant industries are located at long distances from the Partners' headquarters. After consulting with the coordinator APRE, it was decided to re-adjust the study visit focus from "biorefinery" to "other relevant and interesting bioeconomy plant".

In March 2024, an agreement was reached between BTG and Bonhoeffer College (Enschede**, the Netherlands**) that young students from up to three Technasium classes would visit the BTG Group laboratories and biomass conversion plant (Enschede, NL). Located within walking distance, the logistics of travelling from the school to the bioeconomy plant, and vice versa can be easily organised and at a low cost.

In **Italy**, APRE has extended the target group to the elementary school. In the first period, APRE took care of the organisation issues. The visit has been organised in an educational Farm "Fattoria Didattica Cupidi" (2 May 2024) which has a heating plant supplied by biomass. Two classes of elementary school have been invited to participate in learning and educational activities on the topic of energy from renewable sources. One of the two classes involved has been previously trained by researchers within the Horizon Europe SLEs project, of which APRE is partner, on the circular economy, bioeconomy and environmental sustainability through open schooling and STEAM approaches.

When it comes to EUN, in a **pan-European** setting, considering the beneficiaries and the target group of the organisation activities, i.e. international teachers and educators, EUN is unable to provide equal opportunity for them and organise a physical study. The initial plan of EUN included organising a 1-hour career chat with an expert working in a biorefinery in Ghent, Belgium, however, the representative of the plant was not interested in such opportunity. After consultation with the project coordinator APRE, EUN agreed to conduct two 1-hour webinar sessions on the topic of biorefineries and include the webinar recordings as learning materials in the MOOC that will be developed within the project.

Second Reporting Period (since May 2024)

In **Italy**, as explained above, APRE organised a visit to an educational farm "Fattoria Didattica Cupidi" on 2 May 2024, involving 2 lower-secondary classes (students between 10-12 years old) of a Comprehensive school in Rome (I.C. Guicciardini) and their teachers. Students were introduced to the methods of biological farming and the circular approach to resource management. One aspect that particularly impressed students was the innovative use of wood from tree pruning, which not only supports the farm's production needs but also domestic

needs, representing a concrete example of a biorefinery. Moreover, the Farmer has also explained the Farm's commitment to reforestation to the students through a laboratory activity where the students measured the wood to understand how much wood is obtained from tree pruning and to understand that it is also crucial to adopt a sustainable approach in business to safeguard healthy plantation. The students were enthusiastic about the visit to the farm and understood the importance of a sustainable and innovative approach to business, inspiring them to pursue such careers in the future. More information is available on the GenB website (link).

In **The Netherlands**, BTG organised two series of three visits (six visits in total) to the BTG Group laboratories and biomass conversion plants. Visitors included Technasium pupils of Bonhoeffer College (Enschede) and their teachers. The first round of visits was organised in May 2024, involving some 72 pupils. The second round of visits was organised in November 2024, involving 81 pupils. Students were introduced to their GenB assignment (see Task 2.1a above), informed about the BTG company history and bioeconomy research activities, shown around the company premises and pilot set-ups, and learned what it is like to work in the bioeconomy field.

At **Pan-European** level, EUN organised two 1-hr Biorefinery webinars as follows:

- One-hour webinar in collaboration with Scientix, on 14 June 2024, involving two experts working in the BBEPP as speakers. The participants (mainly primary and secondary school teachers) benefited from a detailed session about biorefineries, their operations and their critical role in advancing sustainable energy production. The experts also shared their insights and first-hand experiences from their ongoing work at BBEPP. Teachers explored in depth the concept of biorefineries, and different relevant fields of bioeconomy, and were introduced to skills relevant in this field and materials they could use to pass this knowledge to their students (GenB Library included).
- One-hour webinar in collaboration with Scientix, on 10 September 2024, involving two EC Bioeconomy Youth Ambassadors as speakers. The webinar was intended for educators and multipliers and was focused on the production and utilization of bio-based materials, highlighting the transformation of biomass into innovative products. Two experts in bioeconomy and EU Bioeconomy Youth Ambassadors have introduced the following topics: Biorefineries by Biomasses and Microbes: From Energy to Biomaterials and Innovative Solutions in Forest Bioeconomy: how Fibenol's state-of-the-art biorefinery is reshaping the biomaterials industry.

The recordings of both webinars were included as materials in the MOOC.

Table 27 gives a short overview of the biorefinery study visits organised

Partner	Country	Venue(s)	Date(s)	Context
APRE	Italy	Viterbo	2 May 2024	"Fattoria didattica Cupidi"
BTG	Netherlands	Enschede	May 2024 & Nov 2024	In total 6 visits by Technasium classes of Bonhoeffer College

EUN	Pan-European	Online	14 Jun 2024 & 10 Sep 2024	Stand-alone event in collaboration with Scientix

Table 27 - WP2 format 2.2d: "A Day in a biorefinery" study visits" – events organised.

Table 28 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	3
Countries with implementation (largely) completed	3
Countries with ongoing or planned implementation	0
Events implemented	9
Participants engaged	Ca. 330 (including 45 students and 5 teachers in IT, 153 students and 6 teachers in NL and 132 total participants, including students, teachers and multipliers in EU)
Targets to be engaged	100 students

Table 28 - WP2 format 2.2d: "A Day in a biorefinery" study visit" - impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that **implementation of this task is completed** and the KPI is reached.

4.4.3 Main lessons learned

The study visit provided students with a concrete understanding of how innovation can be integrated into one of the world's oldest professions. Students could see directly how a sustainability and innovation-driven approach can improve production efficiency and positively impact the environment and the community. This hands-on field experience has the potential to inspire students to consider career paths in fields related to sustainability, bioeconomy, and renewable energy, and also demonstrated that modern agriculture can be a fertile ground for scientific and technological innovation, promoting a more sustainable and conscious future starting with the next generation. The success of this activity will be reported at the European level by the GenB project with the hope of being replicated and integrated into the educational models of schools in all member countries of the European Union.

In the pan-European activities, the teachers were particularly interested in the skills needed in this field and how they could bring these ideas into their classrooms. However, they seemed to want more materials to use with their students on the topics discussed specifically. Overall, the webinar sparked a lot of excitement about the different career paths in the bioeconomy.

4.5 Schools' project to grow future bioeconomy entrepreneurs (T2.2e)

4.5.1 Concept of the format/activity and prior experience

Concept: School projects are a specific type of activity that allows consolidating knowledge about the bioeconomy, enabling students to check and/or demonstrate the acquired knowledge, deepening it or even promoting creativity or innovation. The aim of the format is to grow future bioeconomy entrepreneurs.

Inspirational previous experience: Two school competitions within the scope of this activity were organised in Italy before the start of GenB. The first, Bioeconomy4YOU, had an exclusive focus on circular bioeconomy. The second, Startupper School Academy, has a broader focus on innovation and has been thematically enriched with the topic of circular bioeconomy since 2018.

- The **Bioeconomy4YOU** school competition was organised in 2022 in Italy by FVA and APRE together with Re Soil Foundation, Cluster SPRING, Raul Gardini Foundation and Novamont with the aim to raise awareness, inform and educate young generations on the bioeconomy while collecting and awarding the most creative ideas on how they imagine their future in the circular bioeconomy.
- The **Startupper School Academy** is a school competition recognized by the Italian Ministry of Education, organised for several years by Lazio Innova, the Lazio Region organisation responsible for boosting innovation in the region. Since 2018 the Startupper School Academy has been enriched by the thematic award dedicated to the circular bioeconomy, thanks to the collaboration with the EU-funded projects BIOVOICES (from 2018 to 2020), Transition2BIO (from Jan 2021 to Dec 2022) and GenB (from 2023). The objective of the bioeconomy prize of the Startupper School Academy is to: promote awareness and education about bioeconomy, its sectors, impacts and benefits to drive the transition towards more sustainable behaviour of young people; inform on opportunities and inspire study and work careers in the domain.

4.5.2 Activities implemented

Activity	Target	What for	KPI	Target Countries
Schools project to grow future entrepreneurs		To grow future bioeconomy entrepreneurs (e.g. Startupper School Academy) in Italy	#5.000 students	IT

Table 29 -WP2 format 2.2e: schools' projects to grow future entrepreneurs - key characteristics.

First Reporting Period (until April 2024)

GenB implements "Schools' projects" to grow future bioeconomy entrepreneurs in a single country, targeting primary schools, elementary school students (9-13 years old.) and high school

students (14-19 y.o.). FVA, working in collaboration with APRE, was charged to implement the format in **Italy**. FVA did so by participating (again) in the 2023-2024 edition of the Startupper School Academy, which focuses on sustainable living and how the bioeconomy can be integrated into built environments.

The Startupper School Academy is a school competition recognized by the Italian Ministry of Education. Small teams of high school students present a business idea for a product or service dealing with the bioeconomy or with bio-based products. Students receive different types of mentoring and training, to transform their initial idea into a concrete business plan, to be pitched to a jury.

Targets of the format are predominantly high school students (14-19 years old) and their teachers and tutors. As part of the programme, 3 online capacity-building webinars were delivered between November 2023 and February 2024. Specifically, the training session focused on:

- The circular bioeconomy and sustainable living, including how the bioeconomy contributes to environmental challenges and controversial topics
- Biomaterials and bio-based products for sustainable living, including hands-on labs to create do-it-yourself biomaterials and prototypes
- Design thinking session on how to develop an idea.

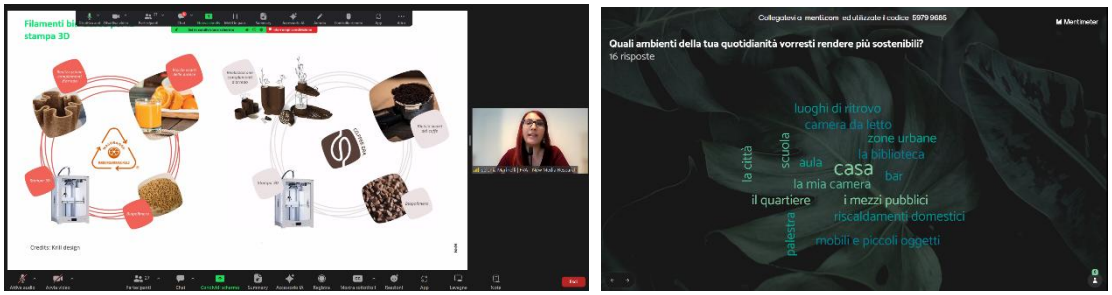


Figure 24 - Schools' projects to grow future entrepreneurs- online activities.

Table 30 gives a short overview of organised schools' project to grow future bioeconomy entrepreneurs.

Partner	Country	Venue(s)	Date(s)	Context
FVA (& APRE)	Italy	Online	Nov 2023 – Feb 2024	Startupper School Academy with Lazio Innova and ENEA

Table 30 - WP2 format 2.2e: schools' projects to grow future entrepreneurs –projects organised.

Table 31 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value

Target countries	1
Countries with implementation (largely) completed	1
Countries with ongoing or planned implementation	0
Events implemented	3
Participants engaged	Around 6000 students reached, directly involvement of 380 students, teachers, and tutors
Targets to be engaged	5000 students

Table 31 - WP2 format 2.2e: "schools' projects to grow future entrepreneurs" - impact against KPI.

The implementation of the activity is completed and the overall KPI has been achieved successfully.

4.5.3 Main lessons learned

Leveraging existing, well-established initiatives like the Startupper School Academy and Bioeconomy4YOU for school projects offers numerous advantages. These initiatives yield higher impact compared to standalone projects, since they benefit from greater promotional resources and organisational support, and reach a wider visibility through partners' communication channels, including media coverage. For instance, Bioeconomy4YOU successfully engaged young generations during Italy's Bioeconomy Day in 2022, showcasing their contributions on a national stage. Similarly, the Startupper School Academy facilitated indirect engagement with regional authorities and policymakers, generating interest in the bioeconomy. Additionally, collaboration with external partners enriches programme content and prize offerings. The capacity-building package developed to support students and teachers can be used in other tasks or activities (e.g. T2.3, T2.4, T2.5, see the next chapters). Additionally, the tutors responsible to follow the students in their day-by-day implementation of the programme should be empowered to ensure a valuable outcome for the school project.

5. Educate young people to promote the biotransition

Task 2.3 promotes sustainable and circular behaviours and lifestyles through the delivery of dedicated educational activities using the toolkits developed in WP1. The following formats have been developed/provided within this Task:

- Task 2.3a: Educational activity using the toolkits
- Task 2.3b: Bioeconomy talks/ seminars inquiry-based learning
- Task 2.3c: Online bio educational village

Table 32 presents an overview of the Task 2.3 formats/activities to educate young people to promote the biotransition, the countries where activities were implemented, and the associated Key Performance Indicators (KPIs).

Activity	Target	What for	KPI	Target Countries
Educational activities using the toolkits		Book for kids, videos, games, quizzes, and exercises	#720 young people	AT, IT, SK, ES, EL, BE, PT, NL
Bioeconomy talks/seminars inquiry-based learning		Inquiry based learning to stimulate students' reflection and debate	#400 young people	AT, IT, SK, ES, EL, BE, PT, NL
Online bio educational village		Self-guided or facilitated online education activities (such as Geco For School, Gather town)	#5.000 young people	EU-wide

Table 32 - WP2 formats to educate young people to promote the biotransition.

Beyond the above formats, which are all foreseen in the GenB GA, a new format was developed, *storytelling for kids*, which aims to raise environmental awareness in children, using different tools (including fairy tales, stories, poetry, riddles, and podcasts). The tools were piloted at different schools and events in Italy (Rome and Frascati, conducted by APRE and FVA) and Greece (conducted by HSPN). In Italy, several young GenB Ambassadors were involved in the pilot implementation. Partner experience with developing and piloting the format is described at the end of this chapter.

5.1 Educational activities using the toolkits (T2.3a)

5.1.1 Concept of the format/activity and prior experience

In T1.4 of WP1 "Co-creation of innovative approaches" a set of GenB educational toolkits were developed for use in the activities of WP2 and WP3. In total 6 toolkits were prepared, as follows:

1. Toolkit for young children (pre- and early-school, 4-8 years old)
2. Toolkit for elementary school students, 9-13 years old
3. Toolkit for high school students, 14-19 years old
4. Toolkit for teachers (formal education professionals targeting students of all ages)
5. Toolkit for other multipliers (including (i) non-formal education professionals: youth organisations, community groups, museums, science communicators, amusement parks, journalists and media, NGOs); (ii) Expert groups; (iii) Communities of practices in education.
6. Toolkit for boosting the collaboration among teachers, parents and youth towards a more sustainable production, consumption, and lifestyles.

The toolkits aggregated and made available, suitable resources from previous EU-funded projects and produced new materials, including:

- Book for kids "What's Bioeconomy" (BIOVOICES) updated version with additional languages for pre- and early-school (4-8 years old)
- Game or gamified educational experience for Elementary school (9-13 years old)
- Bioeconomy quizzes and educational cards for social media and training for high schools (14-19 years old)
- Video teasers and educational videos, for the three target age groups
- Online factsheets "bioeconomy job profiles" for high schools (14-19 years old)
- Educational and information packages for the three target age groups
- Lesson plans, training content, and MOOCs (Massive Open Online Courses)

In terms of content, the toolkit items covered a range of topics related to biotransition. For example, the toolkit for young children (pre- and early-school, 4-8 years old), covered topics and issues such as:

- What is biotransition? Introducing the concept of biotransition and explaining how it relates to our daily lives.
- Why is biotransition important? Exploring the importance of biotransition in areas such as sustainability, food security, and healthcare.
- How does biotransition work? Introducing the science behind biotransition, including genetics, biochemistry, and biotechnology.
- Who are the people involved in biotransition? Introducing the various careers associated with biotransition, such as scientists, engineers, farmers, and entrepreneurs.

5.1.2 Activities implemented

In Task 2.3a children and young people were educated to promote the biotransition through the activities collected and created in the GenB Toolkits. All countries were involved in organising "*Educational activity using the toolkits*" in their respective countries.

Activity	Target	What for	KPI	Target Countries
#24 Educational activities using the toolkits		Book for kids, videos, games, quizzes, and exercises	#720 young people	AT, BE, EL, IT, NL, PT, SK, ES

Table 33 - WP2 format 2.3a: Educational activities using the toolkits - key characteristics.

Toolkit content: as described in detail in D1.3, GenB partners have developed and tested the following content for the toolbox:

- Additional translations, and updating, of the book for kids "What's Bioeconomy" (a BIOVOICES outcome)
- "The Biorace", a board game to increase youngsters' awareness of the sustainable and circular bioeconomy
- "BioHeroes: Let's save the planet!", an educational card game to teach about bioeconomy professions
- Additional hands-on experiments for use in classroom activities with primary school students
- A new format using participatory photographs and additional hands-on experiments to involve students and their parents to reflect and raise awareness about bioeconomy applications in daily contexts
- A new format of Fairy Tales to stimulate curiosity and elicit learning in very young kids
- A series of bioeconomy quizzes and educational cards to engage and educate young people and their families/teachers
- Educational video and video teasers to understand the diverse products derived from biobased feedstocks, illustrating the concrete outcomes of bioeconomy
- An Escape Game "Escape4Future - Chemistry meets Bioeconomy". That integrates inquiry-based learning and a gamified approach.
- A set of bioeconomy job profiles

The contents of the toolkits were implemented depending on the context and audience. Targets include all three age groups of young people (1. Pre-school and early-school; 2. Elementary school, 3. High school) and their teachers. The duration of the face-to-face activity was typically in the order of 1-2 hours per group of students or classroom. The activities were conducted either in collaboration with schools or in the context of events related to the bioeconomy (like festivals).

First Reporting Period (until April 2024)

In **Austria,** ZSI performed an educational activity explaining the concept of bioeconomy and using the contents of the Toolkit to children aged between 6 and 10 years old at the primary school Volkschule Südstadt, Maria Enzersdorf. The main tool used was the "What's Bioeconomy" book for kids. After going through selected chapters of the book, the pupils were given the task of thinking about things they use in their daily lives for example, or things they see around them

that they think could be produced from bio-based materials and then they were asked to draw these. For those who could not think of any products that should be created from bio-based materials, they were asked to think about what they could do to impact the environment positively and then were asked to draw these.
Additionally in **Austria**, during the GenB workshop on the 27th of April 2024 in the context of the Climate Solutions Conference St. Gilgen, ZSI introduced the concept of the bioeconomy to the participants with the help of the GenB toolkit. Some of the formats from the toolkit e.g. examples of hands-on and experiential learning, quizzes and games, book for kids and fairy tales, educational cards, videos and podcasts, BioArtGallery and job profiles were introduced to the participants to inspire them and work on how they can integrate the topic of sustainability and the bioeconomy into their environments.

Figure 25 – Educational activity using the GenB Toolkit to children aged between 6 and 10 years in Austria (left) and working with the GenB toolkit in Austria during the Climate Solutions Conference St. Gilgen (middle and right).

In **Greece**, activities including the toolkits (mainly hands-on labs activities, both pre-existing and newly-developed ones) paired with fun activities like drawing, creating crafts, storytelling and inquiry-based learning were implemented at the Bodossaki Elementary school on 15 December 2023 (development and testing of a new experiment) and during the Athens Science Festival on 16-21 April 2024 (development and testing of a new experiment).

In **Italy**, APRE implemented educational activities using the GenB toolkits in the context of classroom activities (living labs and inquiry-based learning) in primary and low-secondary classes of the I.C. Guicciardini school, Rome (March-June 2023) as well as in a focus group with experts to validate the Living Labs board game (September 2023). On these occasions, hands-on activities, the board game, the bioeconomy village, the Bio-Art gallery, and educational and information packages for different target groups were used. In addition, these toolkits were used in open-air large-scale national events (e.g. “Sustainability Day”, May 2023; Afterschool final event, June 2023) to engage young people, their families and multipliers. Lesson plans and training contents were used with teachers (January 2024 and March 2023).

Also in Italy, FVA implemented a series of bioeconomy quizzes to engage and educate young people and their families/teachers in the context of several events and science festivals (EU Researchers’ Night, Rome Maker Faire Fermhamente Science Festival, Bioeconomy Changemakers Festival – Rome Edition). Through a series of questions, these quizzes applied

inquiry-based learning and gamified approaches to stimulate students' reflection and foster debate. At the last three events, FVA also implemented, in collaboration with high school students of ITT Montani (who participated in the GenB Living Lab, see WP1) the Escape Game "Escape4Future - Chemistry meets Bioeconomy". This game integrates inquiry-based learning and a gamified approach. The players need to solve six interconnected enigmas that address green chemistry and bioeconomy issues through hands-on experiments or games. The last enigma will open a box with bio-based gadgets.

Figure 26 - Escape4Future - Chemistry meets Bioeconomy at Bioeconomy Changemakers Festival – Rome Edition.

In **Portugal**, in the context of both the large-scale event Planetiers World Gathering (October 2023) and the Bioeconomy Changemakers Festival – Aveiro edition (14 March 2024) respectively, the book for kids "What's Bioeconomy?" has been presented in both English and Portuguese to the students, ranging from 7 to 18 years old, attending the events. Teachers who were with their classrooms and families accompanying their children have also been briefed on what the book is about, how it was developed, what contents they may find (e.g., from flap windows explaining basic concepts of the bioeconomy to experiments to be done at home or at school). Additionally, during Planetiers World Gathering, a "Sustainability Quiz" broadcasted via a TV screen and using the Drimify application was implemented by LOBA, targeting 15-18 years old students.

In **Slovakia** educational activities based on the toolkits were conducted in April-June 2023 within the living labs. These activities took place in schools, targeting the ages of 6-9- and 12-13-year-old kids. The materials and formats used included the hands-on labs, Bioeconomy Village, and BioArt Gallery supported by methodologies like storytelling or design thinking.

GenB partner EUN only works with teachers and educators and not directly with children. The partner organised various events targeting teachers and students indirectly, through their teachers. In 2023 two workshops were conducted in their Future Classroom Lab (FCL) in **Brussels,** attracting a total of 41 international teachers and educators. Firstly, a workshop within the context of the FCL teacher training programme *"Future Classroom Lab workshop: Innovative Practices for Engaging STEM Teaching*" on 24 April 2023. Secondly, a workshop during the 40th Science Project Workshop (SPW), was held on 17 June 2023. Both workshops were intended for

international primary and secondary school teachers aiming at introducing participants to the topic and inspiring them to reflect on different activities and materials that can be implemented in the context of their classrooms. In early 2024, two more workshops were organised. On 19 March 2024, a physical workshop "Exploring bioeconomy in the classroom: from theory to sustainability" was implemented within the framework of the FCL teacher training programme: *"Supporting STEM Educators: Innovative Approaches to Teaching and Learning*". The 1.5h workshop was intended for international primary, secondary and teacher trainers. The workshop was split into two parts, where the first part focused on introducing teachers to the basic terms and concepts of bioeconomy, available teaching resources and careers in the field. From 28 Feb to 12 March 2024, an online workshop was organised in collaboration with Scientix as part of the Science Project Online Workshop 17 (SPOW17): 'Sustainability in and outside of the classroom: from Bioeconomy to Nature-Based-Solutions', targeting international teachers and educators. SPOWs are interactive and practical workshops which include 2- 3 parallel tracks covering specific topics and age groups. GenB occupied the 2 tracks focusing on primary and secondary school teachers. The workshop aimed to introduce participants to the topic of bioeconomy and materials from the GenB Toolkit, and to engage participants in collaborative reflection on available resources and activities to introduce bioeconomy in their lessons. Furthermore, the workshop participants were introduced to the different careers in the field, as well as the available materials regarding the introduction of careers in their lessons. A fifth, face-to-face workshop is to be implemented by EUN in the context of the 41st Science Project Workshops, on 5-6 July 2024 in the FCL in Brussels.

Second Reporting Period (since May 2024)

In **Austria**, at a GenB workshop in the framework of the EU Researchers' Night 2024 Graz edition on the 27th of September 2024, ZSI introduced the concept of the bioeconomy. To understand the concept better, the participants, divided into two groups played the Escape4Future game part of the GenB toolkit. Furthermore, visitors of the GenB stand at the European Researchers' Night 2024 had the chance to get to know the contents of the Toolkit, especially to look at and read the "What's Bioeconomy" book for kids.

Figure 27 –Participants playing the Escape4Future game part of the GenB toolkit during the EU Researchers' Night 2024 Graz edition in Austria.

In **Greece**, activities including the toolkits (hands-on labs and inquiry-based learning) were paired with fun activities, like drawing and making crafts along with inquiry-based and experiential learning (walks at the beach and discussion on bioeconomy's connection with beaches and the ocean) were implemented during the Blue Flag 2024 awarding ceremony in Kalamata beach (24 May 2024) and the 2nd Posidonia Festival in Rafina (25 May 2024).

Figure 28 – Implementation of toolkit activities during the Blue Flag 2024 ceremony in Greece (May 2024).

In **Italy,** The GenB toolkit and materials were used with teachers, educators and multipliers (total of 25 participants) in the context of T4.2 "GenB educational model mobilisation and mutual learning workshop" organised on 11 December 2024. On this occasion, participants were introduced to the materials and tools included in the GenB toolkit and provided feedback to implement them in their educational activities. The "What's Bioeconomy" book for kids, part of the GenB toolkit, has been also used and delivered during the European Researchers' Night (Frascati, September 2024) and during the Malnisio Science Festival in Pordenone (22-24 November 2024) as a way to attract and engage young people, their teachers and parents.

In **Slovakia**, PEDAL utilized the GenB toolkit during the Regional Festival of Environmental Organisations "Play for a Green Region" in Žilina on 13 June 2024. The toolkit was introduced to participants as part of various activities aimed at raising awareness about the bioeconomy and engaging young people. For example, the "What's Bioeconomy" book, which is part of the GenB toolkit, was used to present the basic principles of bioeconomy to high school students from the Žilina region.

Figure 29 - Activities based on the toolkits within the living labs in Slovakia.

In **Spain**, the education of young people to promote the biotransition has been facilitated through various tools from the GenB Toolkit. Specifically, the following materials have been utilised: (1) What's Bioeconomy? book for children, (2) game-based experiences, (3) bioeconomy quizzes and educational cards, (4) video teasers and educational videos, and (5) online factsheets on job profiles. Appendix 3: *Extra information for activities implemented in Spain* describes the activities in more detail. Teachers integrated the book into their lessons, as illustrated in Figure 30.

Figure 30 – Various schools using the What's Bioeconomy? book for kids in their classrooms in Spain.

At **pan-European** scale, educational activities using the toolkit were introduced to 46 international teachers in the context of the 2024 Science Projects Workshop – Carbon Act Dissemination Workshop in the Future Classroom Lab in Brussels, held on 5-6 July 2024.

Figure 31 – Activities based on the toolkits within the SPW context in Brussels.

Beyond the "'formal" toolkit content mentioned above, in **The Netherlands** BTG developed various innovative formats particularly suitable for the Dutch context. The formats are designed for primary school children and suited for introducing children to the bioeconomy.

- The **Green Chat Quartet**, a fun and informative card game that showcases different types of biomasses and their applications.
- An engaging **activity booklet**, that offers a variety of interactive exercises such as colouring pages, puzzles, mazes, and rebus challenges. Tailored for children aged 5-8, this booklet combines fun with education.
- A series of three **hands-on experiments**: "Making glue from potatoes", "Playing with natural colours", and the "Touch and Feel" challenge. Suited for introducing children to the bioeconomy.

These formats also serve as great conversation starters about circular bioeconomy topics with parents and guardians. They were presented and tested at various Dutch festivals (Expeditie Next, European Researchers' Night, and Kleer'NZooi XXL – see before). Further testing is considered at the educational museum Museon-Omniversum in The Hague. See also the news item here.

Also, within the context of GenB, in spring 2024 pupils from Bonhoeffer College (Enschede) developed various game concepts to introduce young people in a playful way to the theme of bioeconomy. More information on this assignment and the outcomes can be read in the GenB news item here. In late 2024, BTG commissioned another, similar assignment. This time, Bonhoeffer College pupils were charged to work on an escape game. Work on the second assignment is ongoing. The student assignments are directly linked to the inquiry-based learning format, discussed below.

Table 34 gives a short overview of educational activities using the toolkits organised.

Partner	Country	Venue(s)	Date(s)	Context
ZSI	Austria	Maria Enzerdorf	9 May 2023	Classroom in collaboration with VS Südstadt

		St. Gilgen	27 Apr 2024	St. Gilgen international school's Climate Solutions Conference
		Graz	27 Sep 2024	EU Researchers' Night 2024 Graz edition
HSPN	Greece	Bodossaki	15 Dec 2023	Visit to elementary school for inquire-based learning session
		Athens	Apr 2024 – Feb 2025	HSPN educational programmes, Festivals and Open Events
FVA	Italy	Fermo	Apr 2023	Living Lab with high school students at High school "ITT Montani"
		Lazio	Nov 2023 – Feb 2024	Online webinars with Lazio Innova
APRE	Italy	Rome and Online	Mar – Jun 2023	Living labs at primary and elementary IC Guicciardini school (Rome)
			Sep 2023	Focus group with experts
			Mar 2023 and Jan 2024	Teacher training
APRE &FVA	Italy	Rome	Mar 2024	Bioeconomy Changemakers Festival
		Rome	Sep 2023	EU Researchers' Night with Frascati Scienza
		Rome	Oct 2023	Maker Faire
		Online	Dec 2024	GenB educational model mobilisation and mutual learning workshop
BTG	Netherlands	Zutphen	1 May 2024	Festival Expeditie Next (outdoor kids' science festival)
		Groningen	27 Sep 2024	European Researchers' Night
		Groningen	5 Oct 2024	Kleer'nZooi XXL
		The Hague	13 Nov 2024 – ongoing	(Permanent) museum exhibition at Museon
LOBA	Portugal	Aveiro	Oct 2023	Planetiers World Gathering
		Aveiro	14 Mar 2024	Bioeconomy Changemakers Festival
PEDAL	Slovakia	Within living labs	Apr – Jun 2023	Activities in schools
		Žilina	13 Jun 2024	Regional Festival of Environmental Organisations
		Bratislava	SY 2024 – 2025	Classroom at different schools
AIJU	Spain	Valencia	Apr 2024 – Feb 2025	AIJU ToyLab Experience; Activities in schools

EUN	Pan-European	Brussels	Apr and Jun 2023	Workshops FCL teacher training and Science Project Workshop (SPW)
		Brussels & Online	Feb – Mar 2024	FCL teacher training and SPOW in collaboration with Scientix
		Brussels	5-6 Jul 2024	2024 Science Projects Workshop – Carbon Act Dissemination Workshop in collaboration with Scientix

Table 34 -WP2 format 2.3a: Educational activities using the toolkits – events organised.

Table 35 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	**Value**
Target countries	8
Countries with implementation (largely) completed	8
Countries with ongoing or planned implementation	0
Events implemented	>23
Participants engaged	Ca. 9.500 (including 199 in AT, 1.072 in EL, 3.155 in IT, 467 in NL, 90 in PT, 202 in SK, 4.153 in ES and 130 at Pan-European)
Targets to be engaged	720 Young people

Table 35 - WP2 format 2.3a: Educational activities using the toolkits - impact against KPI.

From the above two tables (on Activities and Impact) it can be seen that the **implementation of this task is completed**. The overall KPI has been achieved successfully.

5.1.3 Main lessons learned

Through a series of hands-on activities, from games to adapting learning materials and developing bioeconomy-related activities, during these workshops, teachers gained a better understanding of bioeconomy and how to include it in their lessons. Teachers find value in workshops and events where they are introduced directly to available materials and provided with an opportunity to explore them and, together with their peers, brainstorm how can be included in their existing curriculum. They can gain practical information and skills on how they can further include the topic in their teaching, according to the age and needs of their students.

After the implementation of the workshops, several key lessons have been identified that will help optimise future activities and enhance the learning experience for both students and teachers. A general assessment of the educational activities using the toolkits, the activities provided an enriching and dynamic experience for participants. Adapting the games and

explanations to the students' age was crucial in capturing their attention. The use of playful, interactive, and participatory methodologies facilitated the understanding of new concepts, fostering curiosity and interest in the bioeconomy through real-life examples.

Additionally, the fact that teachers valued the game as an appropriate resource for both the educational and family settings highlights the versatility of this tool. For future implementations, it would be helpful to add a supporting booklet that delves deeper into the game's responses, which would be useful for both teachers and students.

5.2 Bioeconomy talks/seminars inquiry-based learning (T2.3b)

5.2.1 Concept of the format/activity and prior experience

Inquiry-based learning (IBL) activities focus on asking questions and investigating real-world problems. IBL activities stimulate reflection and debate in the classroom or science-related festivals and events (like European Researchers' Night). In this type of learning environment, participants are actively engaged in the learning process and are allowed to explore their natural curiosities.

Bioeconomy talks/seminars involve inquiry-based learning to stimulate students' reflection and debate on the topic of bioeconomy. The activity involved organising talks or seminars where experts in the field of bioeconomy shared their knowledge and experiences with the students, who were given a chance to ask questions and take part in resulting discussions. By hearing from experts in the field, students (and their teachers) gained a deeper understanding of the importance of bioeconomy and how it relates to their daily lives, as well as exploring potential career opportunities. The duration of the bioeconomy talks/seminars inquiry-based learning activity was typically in the order of 1-2 hours per group of students or classroom. The scope and content of the bioeconomy talks/seminars depended on the context. The activities were conducted either in collaboration with schools or in the context of events related to the bioeconomy (like for example festivals).

5.2.2 Activities implemented

Activity	Target	What for	KPI	Target Countries
Bioeconomy talks/ seminars inquiry-based learning		Inquiry-based learning to stimulate students' reflection and debate	#400 young people	AT, EL, IT, NL, PT, SK, ES, EU

Table 36 - WP2 format 2.3b: "Bioeconomy talks/ seminars" inquiry-based learning - key characteristics.

First Reporting Period (until April 2024)

In Vienna (**Austria**), ZSI staff implemented the "inquiry-based learning" format in a workshop held in the framework of the Vienna edition of the BCF (Bioeconomy Changemakers Festival) on 12 March 2024. Workshop participants were asked to write down questions during a previous

session where they played a card game developed in the ZSI-coordinated Engage4Bio project. Armed with these questions, the participants entered the GenB session where three bioeconomy experts sat in a circle with two empty chairs. The rest of the participants stood around these chairs and had the possibility to go into the “fishbowl” to ask questions and get answers from experts or even from other workshop participants. Once the participant asking the question was satisfied with the answer, she/he could leave the fishbowl to give another participant a chance to ask their questions. The questions included among others:

- Is increasing efficiency in the economic chain in the interest of bioeconomy?
- Free trade and bioeconomy
- To what extent does bioeconomy affect consumer behaviour?
- In which areas will the changeover be the most difficult?
- in which areas will the changeover be the easiest?
- How much potential does bioeconomy have in the effectiveness of the Green Deal?
- Success in reaching the goals of the bioeconomy
- Describe in 1 minute the importance of bioeconomy in your work
- Evaluation of the bioeconomy strategies etc.

Furthermore, ZSI performed the inquiry-based learning approach at the high school AHS Karajangasse in Vienna in April 2023 and during the GenB workshop on the 27th of April 2024 in the context of the Climate Solutions Conference St. Gilgen. After introducing the concept of bioeconomy, the students were encouraged to ask questions and find answers themselves using participatory methods.

Figure 32 - “inquiry-based learning" format in a workshop held in the framework of the Vienna edition of the BCF (Austria).

In **Greece**, HSPN incorporated the format in the hands-on lab activities implemented at Bodossaki Elementary School in Athens on 15 December 2023. More specifically, through an interactive audiovisual presentation, young students (7-9 years old) were introduced to

bioeconomy concepts in the form of an experiential seminar, where vivid Q&A sessions were initiated between the HSPN staff, students of different ages, and their teachers.

Figure 33 – Hands-on lab activities at Bodossaki Elementary School in Athens on 15 Dec 2023 (Greece).

In **Italy**, the Italian partners APRE and FVA applied the format in combination with developing and piloting a bioeconomy board game for young children and a serious game for teenagers:

- During the Italian Living labs (March-June 2023), APRE conducted 4 different inquiry-based learning workshops and hands-on activities with 1 elementary and 1 primary class of the IC Guicciardini school in Rome. The outcomes of these sessions were the development and testing of an educational board game on bioeconomy concepts and bio-based products for 9-13-year-olds. students (fully described in the D.1.3 as part of the GenB toolkit).
- During the Fermo Living Labs (October 2023), FVA played multiple sessions of the "Escape4Future" escape game, a key outcome of the GenB Living Labs workshops organised in Italy in Spring 2023. "Escape4Future" integrates the inquiry-based learning approach to challenge the players in solving enigmas and quizzes on sustainability issues and bioeconomy.

In addition, on 10 May 2023, APRE and FVA jointly organised a seminar for 100 students of the Luigi Sturzo di Castellammare di Stabia high school. The GenB partners presented the bioeconomy, the educational materials, the toolkits for teachers, the experience of the living labs, and the bioeconomy job profiles. By hearing APRE and FVA experts, the high school students (and their teachers) learned to understand the relevance of the bioeconomy and its impact on their daily lives. As a result, 7 students decided to become GenB Ambassadors. They have been involved in several GenB project activities such as the Italian Bioeconomy Changemakers Festival-Rome Edition.

In **Portugal**, in the context of the Bioeconomy Changemakers Festival held in Aveiro on the 14th of March 2024, a career booth was organised whose presentation was adapted to the audience's ages and scholarly degree in each session (3 sessions of 30 students each). For the youngest

participants, the speech was simplified. For the oldest, the concept of green jobs was more explored because of their most considerable cognitive development and comprehension. The presentation was divided into five parts: First, the definition of sustainability and the importance of the usage of natural capital without compromising further generations. The second part was a brief presentation of the SDGs and their relevance. The importance of sustainability for future generations, the importance of the sustainable and circular bioeconomy, and innovation for developing new materials, where bio-based products like apple skin "leather" or smartphone cases made of seaweed were shown. This allowed linking all classroom sessions to the future of jobs, asking the audience about what they expected to be the green jobs that could arise and their importance for achieving the SDG's and a more sustainable future.

In **Slovakia**, the activity took place within the frames of the living lab workshops with the High-school students and with the younger age groups. The series of workshops was built on interactivity, where PEDAL and the Gessayova Leisure Centre as facilitators gradually moved from topics familiar to students (such as climate change, resource depletion, and sustainability) to the topic of bioeconomy. The workshops were held from April 2023 to June. The workshops were designed to engage young people, express their opinions, ask questions, and exchange information with each other. The goal was to create a game for which it was crucial for students to further educate themselves on the topic and expand their knowledge.

In addition to that, the format was implemented during the Bioeconomy Changemakers Festival, March 13th, Nitra edition. PEDAL organised the activities for primary and elementary school students as a series of booths, letting the students explore bioeconomy through pictures, posters, samples of products and hands-on lab activities. The facilitator presented at each of the booths introducing step-by-step the bioeconomy, its applications, jobs, and examples of products from everyday life, and accompanied them through experiments. The facilitator gave young people only brief theoretical information and encouraged them to discover and ask questions. At each booth, pupils were asked to complete 1-2 quiz questions.

At **pan-European level**, EUN only works with teachers and educators and not directly with children. As part of the 39th Science Project Workshop (SPW39, March 2023) and the teacher training organised in the Future Classroom Lab (FCL) in April 2023, several groups of international, primary, and secondary school teachers and teacher trainers attended IBL seminars aimed at introducing teachers to the basic terms of bioeconomy. A total of 55 international teachers and educators working in various levels of education, took part in inquiry-based seminars exploring the topic of bioeconomy, through the basic terms relevant to the field, connections to the curricula and relation to different fields such as arts and humanities.

Second Reporting Period (since May 2024)

34In **Italy**, FVA supported GenB Ambassadors in implementing autonomously the escape game Escape4Future, which integrates the inquiry-based learning approach to challenge the players

in solving enigmas and quizzes on sustainability issues and bioeconomy. Specifically, this activity took place in September 2024 in the context of the EU Researchers' Night in Frascati. GenB Ambassadors conducted 10 rounds of the ESCAPE4Future – Chemistry meets Circular Bioeconomy game, tailoring the experience for two different types of players: a simplified version of the game for the younger ones, and a more challenging gameplay for teenagers and young adults. In total more than 200 players experienced this engaging game, learning by playing facts about the bioeconomy and environmental protection. The Bioeconomy Quiz was also played many times, challenging the participants to answer questions related to bioeconomy and sustainability. The winners of all ages won bio-based gadgets, including the "What's Bioeconomy" book for kids.

Originally working with and via the environmental education NGO Natuur- en Milieu Overijssel (NMO) in Zwolle (**the Netherlands**) and applying their Adviseurs van de Toekomst (*Advisors of the Future*) concept, BTG established a close working relationship with the secondary school Bonhoeffer College in Enschede. In spring 2024 (three classes) and again in winter 2024/2025 (three other classes), the BTG team gave lessons to second graders on bioeconomy in general as well as on selected bioeconomy themes. Subsequently, these Bonhoeffer College pupils were tasked to develop bioeconomy-related game concepts (spring 2024) and escape games components (winter 2024/2025), applying the insights they gained through inquiry-based learning.

In **Slovakia**, PEDAL participated in the Regional Festival of Environmental Organisations "Play for a Green Region" in Žilina on 13 June 2024, where they organised and facilitated multiple activities in collaboration with the Development Agency for the Žilina Region. They organised an interactive activity using the escape room format to engage high-school students in a workshop on bioeconomy.

In **Spain**, an inquiry-based learning (IBL) activity focused on bioeconomy will be held at a secondary school at the end of February or the beginning of March 2025 (dates to be confirmed by the participating school). The activity will involve 50 fourth-graders (15-16 years old). During the seminar, students will engage with questions developed in the Bio Race board game. The students will be encouraged to select the questions that most interest them, which will then be addressed by AIJU technicians. The session will be structured around small groups of five students. Each group member will choose a question from the Bio Race game, and the group will discuss it collaboratively. The AIJU technician will act as a moderator, guiding the conversation and helping to facilitate deeper inquiry and understanding.

Table 37 gives a short overview of bioeconomy talks seminars" inquiry-based learning events and activities organised.

Partner	Country	Venue(s)	Date(s)	Context
ZSI	Austria	Vienna	12 Mar 2024	Bioeconomy Changemakers Festival in collaboration with BOKU
		Vienna	19 April 2023	Classroom

		St. Gilgen	27 April 2024	St. Gilgen international school's Climate Solutions Conference
HSPN	Greece	Athens	15 Dec 2023	Hands-on labs at Elementary School Bodossaki
FVA	Italy	Fermo	Mar – Jun 2023	Living Lab with high school students at High school "ITT Montani"
		Rome	Oct 2023	Fermo Living Labs
		Lazio	Nov 2023 – Feb 2024	Online webinars with Lazio Innova
		Rome	Mar 2024	Bioeconomy Changemakers Festival
		Frascati	Sep 2024	EU Researchers' Night
APRE	Italy	Rome	Mar – May 2023	2 Living labs at IC Guicciardini school
		Rome	Mar – May 2023	3 Hands on Labs at IC Guicciardini school
FVA & APRE	Italy	Online	10 May 2023	Scuola Luigi Sturzo di Castellammare di Stabia
		Rome	Oct 2023	Maker Faire
BTG	Netherlands	Enschede	Apr – Jun 2024	NMO, Bonhoeffer College
		Enschede	Nov 2024 – Mar 2025	Bonhoeffer College
LOBA	Portugal	Aveiro	14 Mar 2024	Bioeconomy Changemakers Festival
PEDAL	Slovakia	Gessayova	Apr – Jun 2023	Living lab workshops
		Nitra	13 Mar 2024	Bioeconomy Changemakers Festival
		Žilina	13 Jun 2024	Regional Festival of Environmental Organisations
AIJU	Spain	Valencia	Feb – Mar 2025	Activities at school
EUN	Pan-European	Brussels	25 Mar 2023	Science Project Workshop (SPW)
		Brussels	17 Apr 2023	FCL teacher training

Table 37 - WP2 format 2.3b: Bioeconomy talks/seminars inquiry-based learning – events organised.

Table 38 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	**Value**
Target countries	8
Countries with implementation (largely) completed	7
Countries with ongoing or planned implementation	1 (Spanish session)

Events implemented	24
Participants engaged	Ca. 4.330 (including 56 in AT, 350 in EL, 3.500 in IT, 153 in NL, 90 in PT, 70 in SK, 50 in ES, and 55 in EU)
Targets to be engaged	400 young people

Table 38 - WP2 format 2.3b: Bioeconomy talks/seminars inquiry-based learning - impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that **the implementation of this task is completed**. The overall KPI has been achieved successfully.

5.2.3 Main lessons learned

It was very helpful for the participants to engage in an activity before the fishbowl exercise – i.e. the card game – to formulate questions rather than doing it spontaneously as normally done with this method. It allowed for more thought-out questions.

The presence of different experts coming from different sectors enabled the participants to receive answers to their questions from different perspectives. When introduced to the basic terms and concepts of bioeconomy teachers shared that although bioeconomy as a term was new to them, the processes and ideas that it involves have been a part of their various lessons. Topics like circular economy, biomass, bio-based materials, or greenwashing have been covered in classes like geography, chemistry or civic education. This indicates that, although not explicitly mentioning the term, school curricula have been including the topic of sustainability and transition to more sustainable lifestyle and choices, providing information, and covering the topic from various aspects.

5.3 Online bio educational village (T2.3c)

5.3.1 Concept of the format/activity and prior experience

Concept: The online bio-educational village is a format whose aim is to offer a self-guided or facilitated online educational spaces, where the students can explore and navigate among educational activities. The format is very effective in introducing the bioeconomy through experiential learning and uses a gamified experience to convey different messages and inspire students to deepen the topics. The aim is to engage students and teachers through practice games, to build knowledge step by step using an informal, experiential approach.

Inspirational previous experience: Two virtual collaboration platforms from Italy targeting young people and using a gamified approach and avatars are of interest. The first one, GECO For School, covers different sustainability topics, including circular economy. The second one, Gather Town, is a platform that provides a virtual context to foster collaboration, communication and facilitate team activities.

GECO For School is an online educational platform providing Italian secondary schools and students with educational modules related to sustainability. This initiative was launched for the first time in 2021 at which time FVA was contacted to contribute by providing content related to the circular bioeconomy. The schools participating in the initiative can enter the platform on a pre-booked date and can freely explore the virtual space, using their 3D avatar. Several events are available, including live interaction and a series of educational content. Ultimately, they should have attended all the training modules and can complete the online gamified self-assessment session. Based on their scores, the best students can win educational prizes, made available by the GECO For School's partners.

Gather Town is an online collaboration platform providing a virtual context to foster collaboration, communication and facilitate team activities. It was implemented in the context of the TETRA project, in which FVA designed a webinar village where all the participants, thanks to an avatar, could explore, interact with people and objects and network with peers. When entering the village for the first time, it is possible to personalize the avatar and select the webcam, speakers, and microphone. While exploring the virtual environment, participants can control their avatars using the arrow keys on their keyboard and facilitators can activate assignments to actively engage them.

The objective of the Online bio-educational village is to offer a blended learning experience, mixing online and offline learning to engage students and teachers in a virtual environment to be explored, which is engaging, fun and immersive. Learners learn through topics presented in images, audio, videos, and text. Students can work independently or in groups, progressing through their learning journeys and having access to various settings and different levels of training materials, including short comprehension exercises, to consolidate learning.

5.3.2 Activities implemented

In Task 2.3c activities linked to online bio-educational village were conducted by FVA, the only GenB partner charged with implementing this format. Targets include elementary school students (9-13 years old), high school students (14-19 years old), and their teachers.

Activity	Target	What for	KPI	Target Countries
Online bio-educational village		Self-guided or facilitated online education activities	#5.000 young people	IT

Table 39 - WP2 formats to educate young people to promote the biotransition - key characteristics.

First Reporting Period (until April 2024)

FVA developed an online exhibition area providing students and teachers with a learning environment. This includes a series of videos covering: (a) the circular and sustainable bioeconomy; (b) bioeconomy and sustainability challenges; (c) bioeconomy and controversial

topics; (d) bioeconomy job profiles; (e) bio-based products in action. FVA's online exhibition is part of a wider educational village addressing sustainability topics (see pictures below).

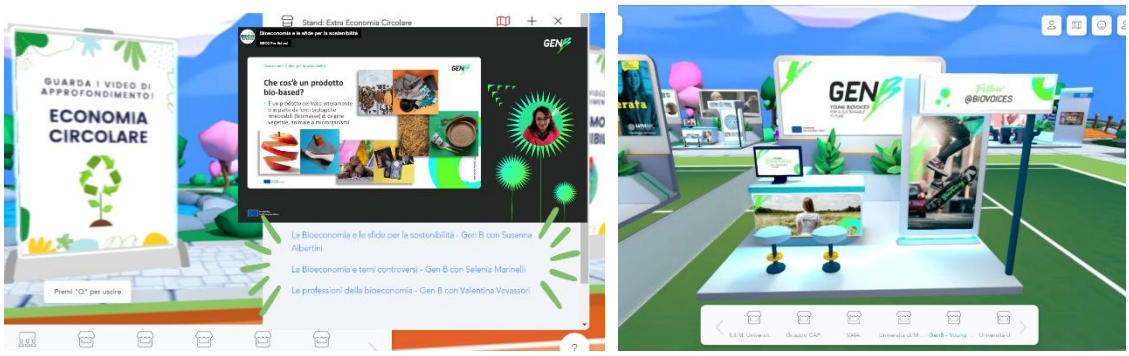


Figure 35 - Online Bio Educational Village.

On 26 May 2023, the GECO For School award ceremony took place at NABA University, New Academy of Fine Arts in Milan. During the event, the initiative's partners were present, together with the GECO team and its scientific committee, to award the students who entered the national rankings and the winning classes of the national "Your Sustainable School" contest. GenB was represented by FVA to award the high school students who participated in the capacity building activity organised by the project (see pictures below).

Figure 36 - Award for the high school students who participated to the capacity building activity.

FVA has been evaluating the possibility to implement an English online escape game in Gather Town, building on the live escape game "Escape4Future: Chemistry meets Circular Bioeconomy", developed with Italian high school students involved in the context of the GenB Living Labs (WP1).

Table 40 gives a short overview of the online bio-educational village events organised.

Partner	Country	Venue(s)	Date(s)	Context

FVA	Italy	Online	Jan– May 2023	GECO online platform in collaboration with GECO For School

Table 40 - WP2 format 2.3c: Online bio-educational village – events organised.

Table 41 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	1
Countries with implementation (largely) completed	1
Countries with ongoing or planned implementation	0
Events implemented	1
Participants engaged	6000 young people and teachers
Targets to be engaged	5000 young people

Table 41 - WP2 format 2.3c: Online bio-educational village - impact against KPI.

From the above two tables (on Activities and on Impact) it can be seen that the **implementation of this task is completed**. The overall KPI has been achieved successfully.

5.3.3 Main lessons learned

The above-mentioned cases exemplify the effective implementation of online educational experiences through gamification, allowing students and teachers to explore virtual environments and deepen educational content. In particular, GECO For School integrates gamified activities into existing initiatives, maximizing impact while partners focus on content delivery. Winners receive educational prizes, enhancing engagement.

5.4 Storytelling on bioeconomy for kids

5.4.1 Concept of the format/activity and prior experience

Storytelling is a valuable tool for raising environmental awareness in young children and the most natural way to stimulate curiosity and elicit learning in very young kids. It includes different types of outcomes (fairy tales, stories, poetry, riddles, podcasts). GenB partners have developed and piloted some of these products during the project implementation and inserted them into their GenB toolkits and on the GenB website (see D.1.3v.2 for details on the development of the toolkits following these formats).

5.4.2 Activities implemented

First Reporting Period (until April 2024)

In **Greece**, in the context of the Hands-on labs experiential seminar at the Bodossaki Elementary School on December 15 2023, the members of the HSPN team used a short audiovisual presentation (PowerPoint presentation and short animated video accompanied by cheerful music) to engage young students of the 2nd, 3rd and 4th grade. The basic concepts of bioeconomy, fossil fuels and bio-based products are explained simply through the eyes of Rita, an environmentally sensitive 1st grader and her journey towards more sustainable choices in life. The presentation was also used during the hands-on lab activities at the Athens Science Festival, as an introduction to bioeconomy for young children and their parents.

Figure 37 – Short lesson on Bioeconomy in Greece.

During the interactions with teachers in GenB and previous projects, the need to have simple, but inspirational stories emerged and, in response to this request, APRE and FVA developed a new format, the Fairy Tale on bioeconomy topics.

In **Italy**, the context of EU Researchers' Night (Frascati, September 2023) young GenB Ambassadors read the fairytale "*The Apple's Dream*". The reading was accompanied by cartoon style images projected in a big screen (FVA) Link. Detailed description of this format is provided in D1.3v.2.

Figure 38 - Young GenB Ambassadors reading the fairy tale in the context of EU Researchers' Night 2023 in Rome (Italy).

In addition, in the context of the «Sustainability Day» (Rome, 31 May 2023) students of an elementary class of the I.C Guicciardini school in Rome, with the facilitation of APRE, transformed a riddle on the bioeconomy into a rhymed rap song. The riddle, translated in English and presented here below, was further performed it in front of their school during an open-air event with parents and multipliers (see Figure 38).

Riddle on learning the bioeconomy through games - IC Guicciardini

If you really want to learn,
it's us, you know, that you should play with.
This game is ours alone, come closer, come on, I'll show you!
So you too can do your part to create a more beautiful world instantly.

The game I'm talking about is the bioeconomy,
if you don't know it, it has to do with ecology!
Move the piece, then jump two spaces, because if you get it right, you'll get more points on those report cards!

From every waste a new life,
nothing is infinite, we have proof of this.
So help us reuse the many biomasses to avoid polluting,
from the sea to the countryside, the stable and the mountains,
everywhere there is a place where you can earn more.

Vegetable products to make new energy,
I tell you that this what the bioeconomy is!
But also clothes, soaps and packaging,
reusing waste gives nothing but advantages.

From flowers, to fishing to crops,
they are all biomass, not strange inventions.
Then they must be transformed in the bio-refinery,
here are new products, and it's not by magic!

At home and at school, we too have many things to do,
organic waste by learning to transform,
because by buying greener products
There's a lot more fun than you think!

Imparando la bioeconomia
IC Guicciardini

Se tu proprio vorresti imparare,
è con noi, sai, che dovresti giocare.
Questo gioco è soltanto nostro,
avvicinati, dai, ché te lo mostro!
Così anche tu puoi far la tua parte
un mondo più bello creare all'istante.

Il gioco che dico è la bioeconomia,
se non la conosci, è ecologia!
Muovi la pedina, poi salta due caselle,
ché se indovini più punti su quelle pagelle!

Da ogni scarto una vita già nuova,
nulla è infinito, ne abbiamo la prova.
Aiutaci tu, quindi, a riusare
le tante biomasse per non inquinare,
dal mare alla campagna, la stalla e la montagna,
dovunque c'è un posto da cui si guadagna.

Vegetali i prodotti per nuova energia,
ti dico che è questa la bioeconomia!
Ma anche vestiti, saponi e imballaggi,
riusare gli scarti non dà che vantaggi.

Dai fiori, alla pesca alle coltivazioni,
sono biomasse, mica strane invenzioni.
Poi vanno ordinate in bio-raffineria,
ecco nuovi prodotti, e non è per magia!

Figure 39 - Riddle on the bioeconomy transformed into a rap song and performed in an open day school event by children of 4th grade, Rome (Italy).

Second Reporting Period (since May 2024)

During the second reporting period, APRE produced 11 stories for podcasts for children from 4 to 8 years old because they provide a brilliant way of learning while having fun, stimulating imagination and curiosity. For this reason, APRE has produced a series of podcasts for children focusing on stories that compose an interesting and coherent pathway to promote the principles of bioeconomy, involving young children to act and become promoters of a more sustainable lifestyle. The series of the podcast consists of 11 stories written by Italian authors. The podcast is composed of 11 stories with a duration of 8 to 10 minutes, in line with the attention span of our 4–8-year-old audience. After the end of the project, APRE will try to enrich the podcasts with new stories written by anyone who wants to participate and translate them into as many languages as possible to captivate and inform a wider target audience beyond the primary target of the podcast. For more info, refer to D.1.3v2 and the news published on the GenB website (link).

In Greece, the audiovisual presentation with Rita was used along with the implementation of the hands-on labs activity during the 2nd Posidonia Festival in Rafina (25 May 2024) as a means to spark conversation about the bioeconomy concepts amongst young children and their parents participating in the activity with interaction with the HSPN GenB team coordinating it.

Performance

Storytelling on bioeconomy is an additional format that was not foreseen/pre-identified in the GA. There is no KPI that has to be met. It was piloted by APRE and FVA and has already been adopted by HSPN.

5.4.3 Main lessons learned

Young people feel ownership of their learning through creative writing and performance techniques. Providing them with the right instruments and guidance on how to express and communicate the bioeconomy in a creative and proactive manner enables them to learn about the contents in an easy and accessible manner and to express it also to other peers of the same age group.

6. Educate teachers in teaching the bioeconomy

Task 2.4 equips **teachers** with a package of knowledge and capacities based on the toolkits developed in WP1 to train their students in bioeconomy through online courses. The following formats (online course modules) have been developed/provided within this Task:

- Task 2.4a: Educating teachers in teaching “Bioeconomy for Educators: Cultivating a Sustainable Future” MOOC
- Task 2.4b: Educating teachers in teaching “How to use GenB toolkits”
- Task 2.4c: Educating teachers in teaching “Bioeconomy job profiles”

Table 42 presents an overview of the Task 2.4 formats/activities to educate teachers in teaching the bioeconomy, the countries where activities were implemented, and the associated Key Performance Indicators (KPIs).

Activity	Target	What for	KPI	Target Countries
“Bioeconomy for Educators: Cultivating a Sustainable Future” MOOC		Training and equipping teachers using the GenB Massive Open Online Course (MOOC)	#800 teachers #12.000 students indirect	AT, EL, IT, NL, PT, SK, ES, EU
How to use GenB toolkits		Training and equipping teachers using the GenB toolkit/s	3 toolkits	
“Bioeconomy job profiles” on factsheets explanation		Training and equipping teachers and career councillors using GenB job profiles	4 job profiles	

Table 42 - WP2 formats to educate teachers in teaching the bioeconomy.

The format "Educating teachers in teaching the bioeconomy" smartly combines and integrates three elements: a massive open online course (MOOC), the use of GenB toolkits and the use of bioeconomy job profiles. Targets included all three age groups of young people (1. Pre-school and early-school students; 2. Elementary school students, 3. High school students) and their teachers.

Task leader EUN developed the structure and the content of the educational items (the MOOC, the toolkit for teachers, and the bioeconomy job profiles) in close collaboration with GenB partners. The content production followed a process of drafting, validating, and aligning content (videos, text resources) with project guidelines, visual identity, and production of teaching materials. Once the educational item was ready for running, GenB partners were asked to disseminate it by organising online workshops for their networks in their countries. The duration of each online workshop was about 1 hour.

6.1 Massive Open Online Course (MOOC) (T 2.4a)

6.1.1 Concept of the format/activity and prior experience

A massive open online course (MOOC) or an open online course is an online course aimed at unlimited participation and open access via the Web. It is a high-quality free training course curated for teachers and educators from various educational settings and levels, that in addition to traditional course materials, such as filmed lectures, readings, and problem sets, provides interactive user forums or social media discussions. Within GenB project, EUN developed a MOOC 'Bioeconomy for Educators: Cultivating a Sustainable Future', in collaboration with Scientix, aimed at practising teachers of students aged from 4 to 19 years old, with all levels of experience and across all subject areas, as well as student teachers preparing for entry into the profession. In addition to the resources developed within the GenB Toolkits, such as lesson plans, educational games, cards and quizzes, job profiles, the content included the knowledge and existing materials developed within the different project preceding GenB, such as BIOVOICES, BLOOM, Transition2Bio, BioGov.net. Participants were, also, introduced to the 7-Steps of Eco-Schools Methodology, a series of measures to guide the schools in becoming more environmentally sustainable, while involving the whole school community in the process. The GenB MOOC is aimed at training teachers on how to introduce the topic of bioeconomy in their classrooms and how to utilize the teaching materials developed within the Gen B Project.

As part of the BLOOM project, EUN developed and coordinated the "Boosting Bioeconomy Knowledge in Schools" **MOOC**, an online flexible training platform for teachers interested in teaching bioeconomy as part of their STEM lessons. The basis of the MOOC was the BLOOM School Box, a collection of lesson plans co-created by 20 BLOOM pilot teachers from 10 countries, which illustrate how bioeconomy can be introduced in different STEM subjects.

6.1.2 Activities implemented

Activity	Target	What for	KPI	Target Countries
"Bioeconomy for Educators: Cultivating a Sustainable Future" MOOC		Training and equipping teachers using the GenB Massive Open Online Course (MOOC)	#800 teachers #12.000 students indirect	AT, EL, IT, NL, PT, SK, ES, EU

Table 43 - WP2 format 2.4a: Educating teachers in teaching "What's Bioeconomy" MOOC - key characteristics.

The "Bioeconomy for Educators: Cultivating a Sustainable Future" MOOC was developed and organised for teachers of all target groups. However, other educators from various educational settings were welcome to participate in the MOOC and tailor the training course/information to their educational settings. The course included a compilation of the materials and resources included in the Toolkit that GenB has developed, designed to enhance understanding of the

bioeconomy and facilitate substantial learning on the subject for various target groups. In addition, through the MOOC participants were introduced to the 7-Steps of Eco-Schools Methodology, a series of measures to guide schools in becoming more environmentally sustainable, while involving the whole school community in the process. By following the course, teachers and educators who are interested in the field of bioeconomy education were able to delve into the field and discover its significance and practical applications in teaching by getting acquainted with the resources of the Toolkit.

The objective of the "Bioeconomy for Educators: Cultivating a Sustainable Future" MOOC is to train teachers of all target ages in teaching bioeconomy by providing them with an introduction to the bioeconomy field and its applications in teaching. In short, through this MOOC, teachers will:

- Familiarise themselves and gain a deeper understanding of various concepts that are central in the field of Bioeconomy.
- Identify the bioeconomy's significance in everyday life and classroom practices.
- Know what the GenB project is, and how it can help innovate their classroom practices.
- Discover and navigate innovative ways of engaging students in the learning process through a methodical exploration of GenB toolkits.
- Gain awareness about the required skills and career opportunities in the field of bioeconomy.
- Learn to design and implement bioeconomy-related activities within the school, through the analysis of best practices and collaboration with peers.
- Engage in a collaborative learning experience with their peers and co-develop a Bioeconomy Learning Activity by applying the skills and knowledge gained through the course.

The MOOC was initially run on the European Schoolnet Academy Platform (EUNA Platform), and the associated materials remain available at this platform. Upon finalisation of the MOOC, GenB partners could additionally host the educational materials on their platforms and the GenB website.

The MOOC and the associated materials were prepared in the English language. However, GenB partners could translate (part of) the MOOC material in their national languages, as they saw fit.

Second Reporting Period (since May 2024)

In **Austria**, ZSI disseminated the details of the MOOC on its website and social media pages. Additionally, ZSI sent the details to its network of relevant stakeholders and encouraged the Austrian ambassadors to share the information with their teachers.

In **Greece**, HSPN disseminated the MOOC through its social media channels and a series of in-person meetings with teachers for the presentation of the GenB toolkit throughout October-November 2024.

In **The Netherlands**, BTG disseminated the details of the MOOC on its website and social media pages. Additionally, BTG sent the details to its network of relevant stakeholders and encouraged the Austrian ambassadors to share the information with their teachers.

In **Slovakia**, PEDAL Consulting organised the presentation of the MOOC during the BioConnect Edu webinar held on 7 November 2024, where teachers and multipliers were introduced to its contents and activities, for the future incorporation into their educational practices with youth, enhancing their knowledge and providing easier access to teaching bioeconomy topics.

In **Spain**, AIJU promoted the MOOC *"Bioeconomy for Educators: Cultivating a Sustainable Future"* among its network of partner schools and actively encouraged Spanish Ambassadors to share the information with their peers and other relevant stakeholders. Additionally, as part of the dissemination of the GenB Educational Model on Sustainable and Circular Bioeconomy (Task 4.2) among teachers, which took place on 13–14 November 2024, the 25 participating educators were informed that a summary of the MOOC content would soon be available on the GenB website. They were encouraged to stay updated by regularly visiting the project's webpage.

At **pan-European** level, EUN developed and implemented the GenB MOOC “Bioeconomy for Educators: Cultivating a Sustainable Future” in collaboration with Scientix®, which ran from October 14 to November 20, 2024, on the EUN Academy platform. The course required up to 25 hours of engagement. Participants engaged through assignments, discussions, and social media activities. Two live events were held: a webinar titled "Educating for Bioeconomy: From Classroom to Community" and a TeachMeet session called "Bioeconomy in the Classroom," where educators presented learning scenarios.

An evaluation survey developed and provided by the EUN Academy collected feedback from 243 participants, with overwhelmingly positive results. A significant portion of the participants expressed willingness to take a similar course again. The learning impact was substantial, as a great majority of participants indicated that they had already implemented some of the ideas from the course, and they felt more confident teaching bioeconomy. Some noted that they had gained insights into AI in composting, discovered they were already incorporating bioeconomy activities into their teaching, and appreciated the GenB resource library.

Further information about the MOOC implementation can be found in Appendix 3.

In addition, the MOOC content can be found both on the GenB Resource Library and EUN Academy platform.

Table 44 gives an overview of activities and events organised to develop and promote the MOOC.

Partner	Country	Venue(s)	Date(s)	Context
EUN	Pan-European	Online	14 Oct to 20 Nov 2024	Implemented as an online course, that ran on EUN Academy platform.

Table 44 – WP2 format 2.4a: MOOC– activities and events organised.

Table 45 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	8
Countries with implementation (largely) completed	8
Countries with ongoing or planned implementation	0
Events implemented	1 MOOC implemented
Participants engaged	>1.350 teachers and >24.500 students indirect (107 teachers and 2.100 students in EL, 264 teachers and 2.920 students in IT, 32 teachers and 600 students in SK, 25 teachers and 125 students in ES, and 947 teachers and 18.940 students in EU).
Targets to be engaged	800 teachers and 12.000 students (indirect)

Table 45 - WP2 format 2.4a: MOOC - impact against KPI.

From the text and from the two tables above (on activities and on Impact) it can be seen that **the implementation of the activity is completed** and the KPI is reached successfully**.**

6.1.3 Main lessons learned

Combining one or more Task 2.4 sub-tasks with extra-curricular activities to consolidate the curriculum taught in lessons is promoted. Although for some teachers the term of bioeconomy was a new word, they referred to many concepts and processes related to the bioeconomy that had already been studied in their lessons (e.g. circular economy, re-use of wasted biomasses). In addition, the teachers told APRE and FVA that having received the educational material from the first of the three sessions would help them to understand the next session and support them in future school green initiatives.

While feedback on the MOOC was largely positive, some suggestions for improvement included more focus on policy and regulatory aspects of the bioeconomy, additional hands-on activities such as experiments and simulations, broader subject integration beyond science and biology, and replacing Padlet activities with a more user-friendly platform. The GenB MOOC successfully deepened educators' understanding of bioeconomy, equipping them with innovative teaching

methods and practical applications. It fostered networking and collaboration among teachers, enhancing their professional development. The course's structure, interactive format, and relevant content resulted in a highly impactful learning experience. While some improvements were suggested, the MOOC effectively empowered educators to incorporate bioeconomy concepts into their classrooms, contributing to a more sustainable future.

6.2 Toolkits (T2.4b)

6.2.1 Concept of the format/activity and prior experience

The GenB Toolkits represent a compilation of materials and resources aimed at promoting knowledge and teaching methods for including Bioeconomy in school curricula and enabling the acquisition of significant learning on the subject. The educational activities within the toolkit aim to take advantage of the didactic potential of different materials and develop learning experiences that allow educating students in Bioeconomy by giving them a leading role in the ecological transition, in accordance with the goal of GenB. These activities will constitute practical cases of knowledge generation on Bioeconomy in real environments.

6.2.2 Activities implemented

Activity	Target	What for	KPI	Target Countries
How to use GenB toolkits		Training and equipping teachers using the GenB toolkit/s	3 toolkits	AT, IT, SK, ES, EL, BE, PT, NL

Table 46- WP2 format 2.4b: Educating teachers in teaching "How to use GenB toolkits" - key characteristics.

First Reporting Period (until April 2024)

In, **Austria**, the content of the GenB toolkit was introduced to participants, both young people and teachers, in the framework of the GenB workshop during the St. Gilgen's school Climate Solutions Conference on the 26-27th of April 2024.

In **Italy**, FVA and APRE implemented intensive capacity building for primary school teachers called "*Teaching the circular bioeconomy to kids*" in Nov-Dec 2022, March 2023 and Jan-Feb 2024. The training aimed at empowering teachers at primary schools with insightful content, educational materials, and inspirational case studies on the bioeconomy and bio-based products. The trainings performed in 2022 and in 2024 were delivered on the "S.O.F.I.A." platform of the Italian Ministry of Education, providing teachers with professional credits. The teachers that successfully completed the trainings were provided with 30 hard copies of the book for kids "What's Bioeconomy?" to be distributed to their students.

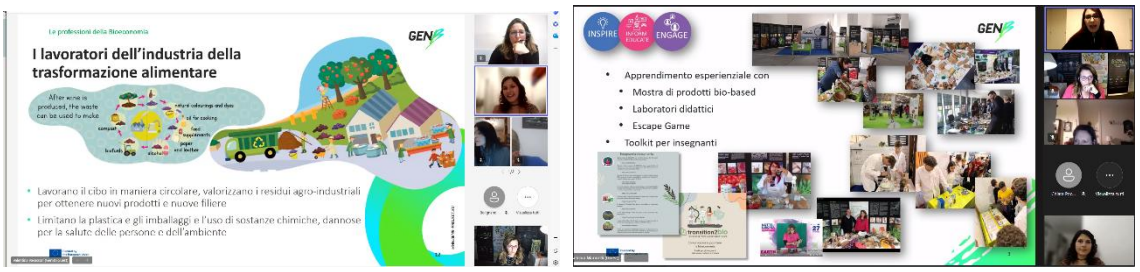


Figure 40 - Teaching the circular bioeconomy to kids at the "S.O.F.I.A." platform of the Italian Ministry of Education.

At **pan-European level**, EUN has presented a toolkit of materials to teach bioeconomy topics to international teachers during various events organised within GenB T2.3a "*Educational activities using the toolkit*". See the relevant Chapter of this deliverable.

Second Reporting Period (since May 2024)

In, **Austria**, on the 19th of February 2025, in the framework of the online workshop under task 2.5 combined with the workshop under task 4.2, besides the GenB educational model, the GenB toolkit was presented and discussed in detail with the participants.

In **Greece**, the GenB toolkit was introduced to teachers of primary and secondary education of the Municipalities of Athens and Trikala, during the Greening Education Partnership in-person training seminars throughout October-November 2024 and during the webinar organised by Q-PLAN with the support of HSPN on 28 November 2024 dedicated to the presentation of the GenB toolkit. Additionally, the toolkit was presented to teachers from Slovenia in the framework of the Erasmus+ project "Food in schools and climate change" and on 31 January 2025 to 13 teachers from all over Europe in the framework of the Erasmus+ project "Sustainable Schools and Classrooms".

In **Italy**, FVA and APRE widely presented the GenB toolkit in the context of the T4.2 GenB educational model mobilisation and mutual learning workshop, which took place on 11 December 2024 and involved primary school teachers and educators. On this occasion, participants were introduced to the materials and tools included in the GenB toolkit and provided feedback to implement them in their educational activities.

In **The Netherlands** and Flanders, BTG promoted the toolkit amongst its Dutch-language network. In the framework of the online workshop scheduled under task 2.5 (+task 4.2), BTG will present and discuss information on the main toolkit materials (the basic tools as well as the tools developed for use in The Netherlands) with the targeted users (formal and non-formal educators).

In **Portugal**, LOBA presented the MOOC to teachers at the following schools in the Gaia district: EB Loureiro, EB Cabo Mor, EB Campolinho 1, EB Marinha, EB Campolinho 2, EB Francelos, EB

Lagos, EB Vila chã. LOBA kept on keeping the teachers updated once the MOOC factsheets were uploaded on the GenB website.

In **Slovakia**, PEDAL organised and facilitated the presentation of the toolkit during individual meetings with multipliers on 23 August 2024. These meetings took place online with representatives from BioPark and in person in Banská Bystrica with representatives from Envirocentrum Banská Štiavnica. The GenB materials were introduced and shared during these sessions. The toolkit was provided in both online and physical formats (where available), ensuring the multipliers had the necessary resources to integrate them into their educational activities with young people.

Additionally, the toolkit was presented during the BioConnect Edu webinar held online on 7 November 2024. During this event, teachers and multipliers were familiarized with its content and activities. Both the online and physical versions of the toolkit (where available) were distributed to participants to support their teaching and engagement with youth.

In **Spain**, the GenB Toolkit materials were presented to 25 national teachers attending the GenB Educational Model workshop (T4.2), held on 13–14 November 2024. During this session, educators received training on the available GenB Toolkit resources, including their topics, formats, and target audiences. Additionally, AIJU conducted an email outreach campaign to its network of 723 partner schools, informing them about the development of these materials and encouraging teachers to integrate them into their lessons.

At **Pan-European**, the GenB Toolkit materials were introduced to 43 international teachers attending the 2-day practical Europeana DS4CH (Common European data space for cultural heritage)[6] Workshop in the Future Classroom Lab in Brussels, on 21 June 2024. The workshop was organised by the Europeana DS4CH project, in partnership with Scientix®. Participants attended a tool fair where they were introduced to the GenB toolkit and how to browse and use them as part of their lessons.

In addition, the GenB Toolkit materials were introduced to 46 international teachers as part of the 2-day practical 2024 Science Projects Workshop – Carbon Act Dissemination Workshop in the Future Classroom Lab in Brussels held on 5-6 July 2024. Participants attended a tool fair where they were introduced to the GenB toolkit.

Table 47 gives an overview of activities organised to educate teachers in teaching the bioeconomy.

[6] About the Europeana DS4CH project: Europeana empowers the cultural heritage sector in its digital transformation. It develops expertise, tools and policies to embrace digital change and encourage partnerships that foster innovation. Europeana is at the heart of the common European data space for cultural heritage, a flagship initiative of the European Union to support the digital transformation of the cultural heritage sector. Access this link for more information about the project

Partner	Country	Venue(s)	Date(s)	Context
ZSI	Austria	St. Gilgen	26-27 Apr 2024	St. Gilgen's school Climate Solutions Conference
		Online	19 Feb 2025	Online workshop
HSPN & Q-PLAN	Greece	Athens and Trikala	Oct – Nov 2024	Greening Education Partnership
		Online	28 Nov 2024	Webinar
		Online	31 Jan 2025	Erasmus+ project "Sustainable Schools and Classrooms"
		Athens	Apr 2024 – Feb 2025	HSPN T-T-T workshops and FEE events for teachers and educations
FVA & APRE	Italy	Online	Nov – Dec 2022, Mar 2023 and Jan – Feb 2024	Training for teachers
		Online	Dec 2024	GenB educational model mobilisation and mutual learning workshop
		Lazio	Nov 2023 – Feb 2024	Startupper School Acad. at Lazio Innova
BTG	Netherlands	Online	Sep 2024 – Feb 2025	Online webinar
LOBA	Portugal	Gaia	Nov – Feb 2025	Awareness raising to teachers
PEDAL	Slovakia	Online	23 Aug 2024	Individual meetings with multipliers
		Online	7 Nov 2024	BioConnect Edu webinar
AIJU	Spain	Online	13-30 Nov 2024	Informative webinar in the context of GenB education model (T.4.2); mailing
EUN	Pan-European	Brussels & Online	Mar 2023 – Mar 2024	FCL training courses, SPOW, Informative webinar within 2024 SDC, SPW
		Brussels & Online	Feb – Nov 2024	2024 SDC, SPW, EUNA, European DS4CH Workshop

Table 47 - WP2 format 2.4b: Educating teachers in teaching "How to use GenB toolkits"– events organised.

Table 48 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	8
Countries with implementation (largely) completed	8

Countries with ongoing or planned implementation	1 (Dutch online workshop)
Events implemented	>10
KPI #2	3 toolkits in each country
KPI #2 progress	3 (preliminary) toolkits established

Table 48 - WP2 format 2.4b: Educating teachers in teaching "How to use GenB toolkits"– impact against KPI.

From the text and from the two tables above (on activities and on Impact) it can be seen that **the implementation of the activity is completed** and the KPI is reached successfully**.**

6.2.3 Main lessons learned

Combining one or more Task 2.4 sub-tasks with extra-curricular activities to consolidate the curriculum taught in lessons is promoted. Although the term of bioeconomy was not familiar to some teachers, they have recognised that many concepts and processes related to the bioeconomy had already been studied in their lessons (e.g. circular economy, re-use of wasted biomasses). In addition, the teachers told APRE and FVA that having received the educational material from the first of the three sessions would help them to understand the next session and support them in future school green initiatives.

6.3 Bioeconomy job profiles (T2.4c)

6.3.1 Concept of the format/activity and prior experience

Bioeconomy job profiles are sets of teaching materials consisting of bioeconomy factsheets and interviews with bioeconomy experts, intended for high school (14-19 years old) and their teachers. These materials contain information and explanations of career and educational possibilities in the field of bioeconomy, featuring professionals that provide insights from the field to spread awareness, inspire and motivate high school learners to pursue a profession in bioeconomy. These formats would allow teachers to raise students' interest towards bioeconomy from the perspective of different science, technology, engineering and mathematics STEM and non-STEM fields that play an important role in the transition to circular and more sustainable lifestyles.

EUN has implemented the Job Profiles format with great success as part of the STE(A)M IT project, in which a series of career profiles were developed, collected and published (link). These are intended for teachers and career counsellors to contextualize STEM careers in the classroom, and to inform and inspire secondary school students to pursue STEM careers.

6.3.2 Activities implemented

Activity	Target	What for	KPI	Target Countries

"Bioeconomy job profiles" on factsheets explanation		Training and equipping teachers and career councillors using GenB job profiles	4 job profiles	AT, EL, IT, NL, PT, SK, ES, EU

Table 49 - WP2 formats 2.4c: Bioeconomy job profiles - key characteristics.

First Reporting Period (until April 2024)

In various GenB partner countries, initial experience has been gained using GenB teaching materials to educate teachers.

In **Austria**, ZSI presented the job profiles while introducing the GenB toolkit in the context of the GenB workshop at the St. Gilgen international school's Climate Solutions Conference.

In **Greece**, Q-PLAN organised the satellite event "Careers and opportunities in the Bioeconomy sector" at the Ok!Thess innovation hub in Thessaloniki on 14 March 2024. The daylong event was full of informative sessions and inspirational storytelling, aimed at providing students and young professionals with practical information on how to start a career in bioeconomy, advance their skills and knowledge, as well as to pursue employment and entrepreneurial opportunities in Thessaloniki and Central Macedonia. More than 40 young professionals, academics and students participated.

In **Portugal**, together with a range of other organisations, and in connection with Pi Day and the national mathematical games championships, LOBA organised the Aveiro satellite of the Bioeconomy Changemakers Festival on 14 March 2024. More than 1,800 students from every corner of Portugal participated in the game competition, and in this context, GenB organised the Bioeconomy Village, Hands-on labs and a Career Booth to inspire and inform students from 7 to 18 years old. The concept of green jobs was explored by the older students.

In **Slovakia**, to pilot educating teachers in teaching "Bioeconomy job profiles", PEDAL took advantage of the *You(th) in and for bio-regions Conference*, the local event that is organised as part of the Nitra satellite event of the EC's Bioeconomy Changemakers Festival, in March 2024. At the event, PEDAL organised a presentation of future jobs in bioeconomy within the frames of career talks, featuring young scientists, entrepreneurs/start-ups, student companies/projects, and initiatives.

At pan-European level, EUN has introduced the job profiles to an audience of international teachers, that participated in various online and face-to-face events, such as the online workshop that was part of the Science Project Online Workshop 17 (SPOW17): '*Sustainability in and outside of the classroom: from Bioeconomy to Nature-Based-Solutions*', face to face FCL Teacher Training the Informative webinar, all of them taking place in 2024. During these events, participants learned about the different careers in the bioeconomy field, the different job profiles developed within the project and the materials available to introduce careers in their lessons. Additionally, the various Job Profiles developed in GenB are part of the materials listed for the Scientix-Bioeconomy Awards that teachers can use to organise Bioeconomy activities.

Second Reporting Period (since May 2024)

In Austria, the job profiles, like the toolkits, were one of the agenda points of the online workshop on 19 February 2025 involving both the teachers and multipliers. The activity was implemented as part of Task 2.5 and Task 4.2.

In **Slovakia**, PEDAL presented the Bioeconomy Job Profiles on 5 November 2024 during its "BioConnect Edu" online webinar. The webinar aimed to engage teachers and multipliers by introducing them to the bioeconomy job profiles and demonstrating how these can be integrated into their educational practices and provide inspiration for their students.

In **Spain**, the Bioeconomy Job Profiles were introduced to 25 national teachers during the GenB Educational Model workshop (T4.2), held on 13–14 November 2024. During this session, educators received training on the available GenB Toolkit resources. Moreover, as part of the "Educational Activities Using Toolkits" (T2.3a), an additional five teachers were trained alongside students. Specifically, during the Local Capacity Building Webinar, two teachers participated in the training, while three more were involved in a training session conducted during a school visit in February 2025. This session was attended by 50 students aged 13–14. For further details, refer to Section 5.1.2.

Additionally, AIJU carried out an email outreach campaign targeting its network of 723 partner schools, informing them about the development of these materials and encouraging educators to integrate them into their teaching practices.

In **Italy**, the job profiles were introduced to teachers and multipliers on two different online workshops to inspire them about the new skills, jobs and career opportunities in the bioeconomy sector. During the workshops, presentations were given on the future jobs in the bioeconomy and the factsheets containing the job profiles were presented as part of the GenB toolkit for high-school students.

In the **Netherlands** and Flanders, BTG is promoting the job profiles amongst its Dutch-language network.

At **pan-European level**, EUN introduced the job profiles to various international educators between October and November 2024, as part of the MOOC activity.

Table 50 gives an overview of activities organised to develop and promote the Bioeconomy job profiles

Partner	Country	Venue(s)	Date(s)	Context
ZSI	Austria	St. Gilgen	26-27 Apr 2024	St. Gilgen Climate Solutions Conference
		Online	19 Feb 2025	Online workshop

Q-PLAN	Greece	Thessaloniki	14 Mar 2024	Event: "Careers and opportunities in the Bioeconomy sector"
APRE and FVA	Italy	Online	11 Dec 2024	GenB education model MML workshop with teachers and multipliers to present the GenB toolkit and materials (20 participants)
BTG	Netherlands	Online	Feb – Mar 2025	Online workshop
LOBA	Portugal	Aveiro	14 Mar 2024	Bioeconomy Changemakers Festival
PEDAL	Slovakia	Nitra	Mar 2024	"You(th) in bio-regions Conference"
		Online	5 Nov 2024	BioConnect Edu webinar
AIJU	Spain	Online, Valencia & Alicante	13–14 Nov 2024 (online), Feb 2025 (in person)	Informative webinar in the context of GenB education model (T.4.2); activities at school; mailing
Pan-European (EUN)	Belgium	Online & Brussels	Feb – Nov 2024	SPOW17, FCL Teacher Training, the Informative webinar, MOOC

Table 50 – WP2 format 2.4c: Bioeconomy job profiles – activities organised.

Table 51 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	**Value**
Target countries	8
Countries with implementation (largely) completed	8
Countries with ongoing or planned implementation	0
Profiles planned	4 job profiles in each country
Profiles established	4 (preliminary) job profiles established

Table 51 - WP2 format 2.4c: Bioeconomy job profiles – impact against KPI.

From the text and the two tables above (on activities and on Impact) it can be seen that **the implementation of the activity is completed** and the KPI is reached successfully**.**

6.3.3 Main lessons learned

The event “Careers and opportunities in the Bioeconomy sector” organised by Q-PLAN in Thessaloniki, Greece on 14 March 2024 provided several valuable lessons:

- **Networking is Key**: The event emphasized how crucial networking is for career growth. Attendees had the chance to meet and connect with professionals, academics, and peers, opening doors for future collaborations and job opportunities.
- **Continuous Skill Development**: It was clear that staying updated with new technologies and methodologies is essential. The sessions highlighted the importance of continuous learning to stay relevant in the bioeconomy sector.
- **Diverse Career Paths**: The event provided a clear picture of the various career paths available in bioeconomy. Real professionals, including successful entrepreneurs and industry experts, shared their career journeys and challenges. For instance, representatives from companies like Ledra Fertilisers and Clean Stories, as well as projects like InCommon and Staramaki, offered diverse perspectives and inspiring stories.
- **Educational Opportunities**: Representatives from the International Hellenic University and Perrotis College presented educational programs and study opportunities, giving attendees valuable information on how to pursue a career in bioeconomy.
- **Entrepreneurial Inspiration**: Inspirational storytelling sessions showcased successful ventures in the bioeconomy sector, encouraging participants to consider entrepreneurial paths and innovative projects.
- **Local Support**: The event highlighted the support available in Thessaloniki and Central Macedonia for those interested in bioeconomy careers. This includes educational programs and regional policies aimed at fostering growth in this sector.

In Spain, teachers trained with the Bioeconomy Job Profile Factsheets suggested the inclusion of a complementary dossier containing key concepts. As non-experts in the field, they expressed the need for additional background information to confidently address potential student inquiries.

Additionally, they recommended enhancing the factsheets with an "A Day in the Life of..." segment. This feature, structured as a short documentary-style report, would provide students with a first-hand look at daily tasks and responsibilities within these professions, making the career pathways more tangible and engaging.

7. Inform and educate other multipliers to promote the bioeconomy

Task 2.5 engages and supports **non-formal educators** (such as museums, theatres, festivals, fairs, amusement parks, journalists, NGOs, science communicators, media producers, etc.) that work with young generations to act as multipliers by adopting the GenB toolkits as part of their activities. The following formats have been developed/provided:

- Task 2.5a: Informative webinar in partners' countries
- Task 2.5b: individual meetings with 3 multipliers in each country

Table 52 presents an overview of the Task 2.5 formats/activities to inform and educate other multipliers to promote the bioeconomy, the countries where activities were implemented, and the associated Key Performance Indicators (KPIs).

Activity	Target	What for	KPI	Target Countries
8 informative webinars in partners' countries (one each)		"How to embed bioeconomy in informal education settings". Engaging multipliers to adopt GenB toolkits.	#80 multipliers #4.000 young people indirect	AT, EL, IT, NL, PT, SK, ES, EU
24 individual meetings (3 multipliers in each partner country)				

Table 52 - WP2 formats to inform and educate other multipliers to promote the bioeconomy

7.1 Informative webinar with multipliers (T2.5a)

7.1.1 Concept of the format/activity and prior experience

The webinars aimed to empower organisations outside the GenB consortium working with young people and to raise awareness or educate about the bioeconomy through their activities. According to the GA multipliers can include various non-formal educators, such as museums, theatres, festivals, fairs, amusement parks, journalists, NGOs, science communicators, media producers, etc.

The aim of the webinars was both to introduce the bioeconomy and to show concrete examples of how bioeconomy can be presented or taught in their activities. A series of modules was created that project partners were able to adapt to the type of multipliers attending the webinar in their country, providing a practical webinar. The webinar builds up on Task 1.4 and its results (a set of GenB Toolkits). In addition to that, GenB has collected several tools, and materials from and is developing new ones. The team could also offer the experience gained in various activities aimed at awareness-raising, informing, or educating about bioeconomy.

7.1.2 Activities implemented

In Task 2.5a an informative webinar was (or will be in some cases) organised in each GenB partner country. The webinar typically lasted up to 2 hours. The webinars have built capacities outside the GenB consortium and empower multipliers in GenB countries to continue the efforts in raising awareness, informing, and educating young people about bioeconomy and increasing the impact of GenB in partner countries.

A series of webinar modules (recordings) presenting various topics related to bioeconomy was prepared in collaboration with GenB partners. Each partner had the opportunity to adjust the content of its informative webinar to the type of multipliers in their countries, their level of knowledge, and the type of activities conducted by the multipliers or planned to be carried out within GenB.

The webinar provided information on content related to the bioeconomy and to the GenB Project. Each webinar was implemented online either as a stand-alone activity or as part of a larger online event relevant to the bioeconomy.

Activity	Target	What for	KPI	Target Countries
8 informative webinars		How to embed bioeconomy in informal education settings.	#80 plus #24 multipliers; #4.000 young people indirect	AT, IT, SK, ES, EL, BE, PT, NL

Table 53 - WP2 format 2.5a: Informative webinar with multipliers - key characteristics.

First Reporting Period (until April 2024)

In **Italy**, APRE piloted the format in the autumn of 2023. In the context of RuralBioUp, APRE recorded video training materials for regional facilitators on teaching toolkits and experiential formats/activities to teach bioeconomy in schools (October 2023) and on future career opportunities in the bioeconomy for young adults (November 2023).

Also in **Italy**, in February 2024, FVA implemented a training webinar on bioeconomy with Lazio Innova, which supports innovation and economic development in the Lazio Region (see picture below). Multipliers from the eight FabLabs of Lazio Innova were empowered with GenB contents, tools, formats and gamified solutions, to foster their replication in the region and engage younger generations, also in light of the satellite events organised in the Lazio Region for the Italian Bioeconomy Changemakers Festival - Rome edition. The event involved 27 multipliers.

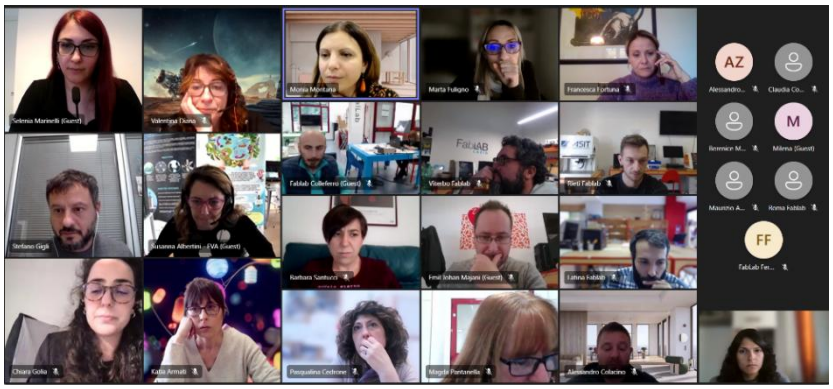


Figure 41 - Informative webinar on bioeconomy with Lazio Innova.

AT **pan-European level**, Partner EUN organised an informative webinar 'How to embed bioeconomy in non-formal and informal education settings' in collaboration with Scientix in the context of the 2024 STEM Discovery Campaign. The webinar was open to various target groups, whilst participation was ensured by registering for the event. The webinar was conducted on 20 March 2024, and led by a distinguished Scientix Ambassador, an expert in non-formal education. The webinar aimed to equip participants with invaluable insights and resources for integrating bioeconomy topics into educational programs. During the webinar, the speaker shared his experience with implementing bioeconomy as part of his various activities mainly with students aged 6 to 14. In addition, he introduced the audience to different GenB materials and formats that they can implement in their educational settings. The event was attended by 26 multipliers, mainly educators teaching in formal education from 15 countries in Europe and beyond.

<u>Second Reporting Period (since May 2024)</u>

In **Austria**, ZSI conducted an online webinar on 19 February 2025. Since the aims of Task 2.5 and Task 4.2 complement each other, they were combined into a single session involving both multipliers and educators. Relevant organisations were identified and sent personalised invitations to educators and key multipliers, including formal education organisations and non-formal educators such as museums, theatres, festivals, fairs, amusement parks, journalists, NGOs, science communicators, and media producers. A total of 21 persons have registered for the webinar. During the webinar multipliers and informal educators were introduced to GenB and its activities as well as to the concept of bioeconomy. Furthermore, participants received information regarding the GenB educational model and were familiarised with the GenB toolkit. They received an overview of all tools of the toolkit and received more detailed information on the material especially designed for educators and multipliers, as well as on selected tools for their young target groups. The presentation was broken up with MentiMeter questions and plenary discussion regarding their experiences with children and teenagers in connection with green topics as well as their impression and feedback on the future implementation of the toolkit in their activities. The model and particularly the toolkit were highly well received and considered highly relevant to all participants in their professional activities. After the webinar the presentation, including links and access to the toolkit, was shared with all participants.

In **Greece**, Q-PLAN with the support of HSPN, organised an online webinar on 28 Nov 2024, to familiarise non-formal educators and multipliers with the concept and applications of bioeconomy, demonstrate the different tools of the GenB toolkit and guide them on how exactly to use them in the framework of their activities. The participants (17 in total) represented a wide array of organisations. During the online webinar, Q-PLAN created a "studio" in which the GenB experiments were prepared to be demonstrated, Q-PLAN used the Bio-Art Gallery as a font to promote it. Afterwards, the presentation of the webinar was shared with all the participants, containing the links and access to everything that was demonstrated within. A few days after the webinar, the participants (the ones that expressed their interest) received an information package with the book, the memory game deck of cards, the experiment leaflets, a t-shirt, the bio-art gallery in Greek – made in the framework of the BIOVOICES project –, the elephant poo notepad and other gadgets.

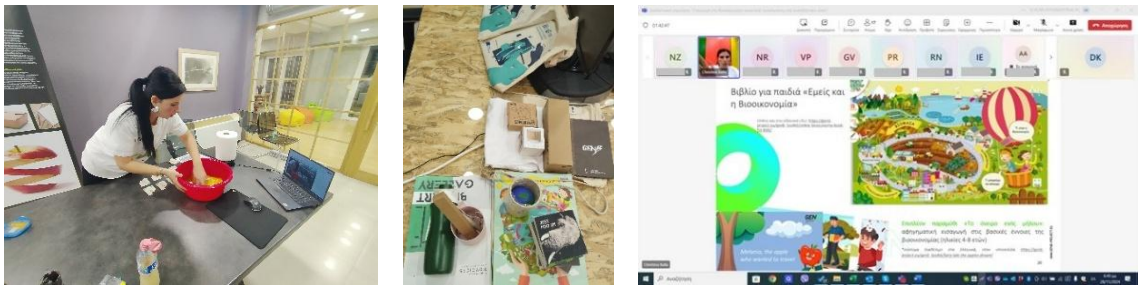


Figure 42 – Online webinar showcasing the GenB experiments (left), the information package (middle) and the webinar itself (right).

In **Italy**, APRE organised a 3-hour webinar with 9 well-known authors who were asked to write stories for children (age 4-8) on the bioeconomy. On 18 July 2024, APRE held an online meeting with all the authors, where they were introduced to the GenB project, shared their background and ideas for the stories and met the team. Throughout the meeting, a capacity building was held, where APRE informed these important multipliers about the bioeconomy sector, its opportunities, challenges and its applications, bio-based products and the bio-based professions, so that they could integrate these concepts into their stories and translate complex concepts in simple and engaging stories for children. After this capacity building with APRE, the authors began working on their first story drafts. More information on the creation of the stories and podcasts can be found in the GenB website (link). Moreover, APRE and FVA organised a hybrid meeting with European and national policymakers and stakeholders in field of educational and bioeconomy (e.g. Universities, research centres, and similar European initiatives). The Partners have discussed the topic of bioeconomy education that was recognised as central in light of the transition towards a sustainable economy and society. For more information, find here.

In The **Netherlands** BTG will mimic the approach adopted in Austria, Portugal and Slovakia, and invite both multipliers and teachers to an online workshop, covering Task 2.5 and probably Task 4.2 as these tasks have complementary aims. The workshop is scheduled during the 2025 Week of the Circular Economy, in the period 17-21 March 2025.

In **Portugal**, LOBA is organising an online webinar in March 2025 with the representatives of primary school district of Gaia (EB Loureiro, EB Cabo Mor, EB Campolinho, EB Marinha, EB Campolinho, EB Francelos, EB Lagos, EB Vila chã) of the municipality of Gaia and Fabrica. The webinar will first consist in a round table summarising the multiple sessions and collaborations established with the network of schools on Gaia. Second, LOBA will guide the two organisations through all GenB materials and formats that could be implemented in their activities. The webinar will first consist in a round table summarising the multiple sessions and collaborations established with the network of schools on Gaia. Second, LOBA will guide the two organisations through all GenB materials and formats that could be implemented in their activities.

In **Slovakia**, an online webinar for multipliers, Biconnect Edu (link), was organised on November 5 and 7, 2024, lasting two hours on each day. It brought together professionals from various sectors, including Leisure Centre Žiar nad Hronom, Rafael Gardens, IZPI Nitra – Institute of Knowledge-Based Agriculture and Innovation, Administration of the Low Tatras National Park, Slovenská Ľupča, Leisure Centre Včielka Púchov, Development Agency of the Banská Bystrica Self-Governing Region, and others.

The webinar served as a capacity-building session and a platform for discussion, where participants shared the challenges, they face in their work and what resources they need. It became evident that there is a high demand for youth-oriented materials, particularly didactic content and visual aids to help explain bioeconomy concepts.

Participants were introduced to GenB activities and materials, which they can integrate into their educational practices. Additionally, as part of this initiative, a video introduction to bioeconomy for educators was created and is now available in the GenB Library.

In **Spain**, three informative webinars were conducted—two online and one in person. The online sessions were held with Febiotec, the Spanish Federation of Biotechnologists, and Surfrider Foundation, an NGO dedicated to protecting aquatic ecosystems. The in-person session took place at the Valencian Toy Museum, located in Ibi, Alicante.

These three sessions followed the individual meetings with multipliers (T2.5b). During these informative sessions, each multiplier received the most relevant GenB-developed resources based on their institution's expressed specific needs. During the meeting with Surfrider Foundation focused on the protection and enjoyment of the world's ocean, the GenB project and its educational materials were introduced in detail. Surfrider Foundation expressed interest in the project and shared useful links from the Ministry of Education to support educational initiatives on sustainability. Although they will not be able to include more content in their school talk program for 2025 due to the high demand for materials, they expressed willingness to consider using GenB materials in the future to complement their lessons. Additionally, the possibility of collaboration on social media was discussed, and a response is awaited regarding the feasibility of sharing Biovoices-related content on their platforms.

Table 54 gives a short overview of informative webinars organised.

Partner	Country	Venue(s)	Date(s)	Context
ZSI	Austria	Online	19 Feb 2025	Workshop with both educators and multipliers as part of T2.5 and T4.2
Q-PLAN & HSPN	Greece	Thessaloniki / Online	28 Nov 2024	Online webinar with multipliers
APRE	Italy	Online	Oct – Nov 2023	Events (capacity building training) for regional facilitators, RuralBioUp
		Online	18 July 2024	Capacity building webinar with Italian authors for storytelling
		Hybrid	24 May 2024	"Bioeconomia circolare per la Transizione Ecologica: nuove competenze e bisogni formativi" Event at the Council Presidency of the Council of Ministers in Rome
FVA	Italy	Online	Feb 2024	Training activity at FabLabs Lazio Innova
BTG	Netherlands	Online	17-21 Mar 2025	Online workshop
LOBA	Portugal	Aveiro	Mar 2025	Online webinar with municipality of Gaia and Fabrica
PEDAL	Slovakia	Online	5 and 7 Nov 2024	Biconnect Edu
AIJU	Spain	Online, in person	Dec 2024 – Feb 2025	FEBiotec – Spanish Federation of Biotechnologists; Surfrider Foundation Spain; Valencian Toy Museum
EUN	Pan-European	Online	20 Mar 2024	2024 SDC in collaboration with Scientix, Natalija Budinski, Scientix Ambassador

Table 54 - WP2 format 2.5a: Informative webinar in partners' countries – events organised.

Table 55 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	Value
Target countries	8
Countries with implementation (largely) completed	8
Countries with ongoing or planned implementation	2
Events implemented	>10
Participants engaged	Ca. 112 multipliers and 2.350 young people indirect (including 21 multipliers and 290

	young people in AT, 17 multipliers and 240 young people in EL, 34 multipliers and 800 young people in IT, 10 multipliers and 500 young people in SK, 4 multipliers in ES and 26 multipliers and 520 young people in EU.
Targets to be engaged	80 multipliers (10 per country)
KPI #2	4000 young people (indirect)

Table 55 - WP2 format 2.5a: Informative webinars in partners' countries - impact against KPI.

From the text and from the two tables above (on Activities and on Impact) it can be seen that **several activities have been implemented targeting multipliers.** The next activities will be implemented in March 2025. The multiplier KPI has been reached, the young people KPI not.

7.1.3 Main lessons learned

To empower the multipliers, it is necessary to show practical examples, as close as possible to the core activities of the participating multipliers. Based on registration, reviewing the focus and activities of participants is recommended and based on this, provide tailor-made webinar content in addition to general information on the bioeconomy. Moreover, offering tangible biobased products to the multipliers helps them introduce bioeconomy to younger ages with real examples of everyday products.

During the Pan-European webinar, it was reflected on the difficulties non-formal and informal educators have in efforts to collaborate with schools on different programs and activities. It is still a common practice of starting the collaboration from personal contacts, which limits the reach of the programs. The speaker emphasized the importance of fostering and enhancing collaborations with formal education institutions and creating more targeted programs for schools.

7.2 Individual meetings with multipliers (T2.5b)

7.2.1 Concept of the format/activity and prior experience

The activity aimed at expanding the network of cooperating organisations in partner countries. Meetings with various multipliers allowed to increase the impact of the GenB project partners.

The aim of these meetings was to inform multipliers about the activities of the GenB project, available materials, tools, and activities, thus enabling these organisations to further replicate the activities implemented by the GenB project or organise their own activities. Meetings could result in closer cooperation, for example in the form of joint activities and they can be also invited to the webinar.

7.2.2 Activities implemented

The meetings were held either as online or physical events. The key purpose of the individual meetings was to develop closer collaboration with selected multipliers in future GenB activities. The meeting typically lasted up to 1 hour. At the meeting, the GenB project, the GenB formats (e.g. the Living Labs organised within WP1 in Austria, Italy, and Slovakia, see D1.2 Report on co-design activities) and the educational materials that have been, or are being, developed (such as the GenB toolkits, see sub-task T2.3a *Educational activities using the toolkits*) and that can serve as inspirational experience, were presented.

Activity	Target	What for	KPI	Target Countries
24 individual meetings		Engaging multipliers to adopt GenB toolkits.	#80 plus #24 multipliers; #4.000 young people indirect	AT, EL, IT, NL, PT, SK, ES, EU

Table 56 - WP2 format 2.5b: individual meetings with multipliers - key characteristics.

First Reporting Period (until April 2024)

In **Austria**, ZSI held 1-on-1 meetings with different multipliers. All took place online.

- Gottfried Hebenstreit, consultant of economic and energy policy and Ökosiziale Forum Österreich und Europa to discuss collaboration with GenB project. As a result, ZSI staff presented the GenB project to an audience of about 500 people from the sector, hosted a stand and implemented the online BioArt Gallery at the bioeconomy Austria summit 2023 on 7 November 2023.
- Maia Bristol, sustainability coordinator of St. Gilgen eco school to discuss collaboration in GenB activities. As a result, GenB will take part in the climate solution conference organised by the school on 26-27 April 2024. The contact with Maia was established after she contacted ZSI once she realised that ZSI was the Austrian partner at the GenB common grounds camp. She participated in the event online.
- Matthias Slatner, innovations manager at ACIB GmbH which has been organising the European Researchers Night in Graz and upper Austria for the past couple of years to discuss possible collaboration. The contact was made at the Bioeconomy Austria Summit event. The meeting held in early 2024 year secured the participation of GenB at the next European Researcher's Night in Graz (September 2024).

In **Italy**, APRE organised several one-to-one online informative meetings with different type of multipliers such as WWF Italia, Office of the Premiership, Unitelma Sapienza - Circular Bricks project, La Piazza SLR Media Company, MOMO editorial house, Festival della Scienza, Genova (2024), Trieste Next (2023), presenting the project and the main activities, as well as the results and exploitable formats with the aim to educate and train the multipliers, by utilising the developed formats and materials. Moreover, early in the project, FVA organised a first individual meeting with BioEco Academy Grand Est (France), to present replicable formats in their context

and discuss possible capacity building/webinars for the team. Sine that initial meeting FVA and APRE have established various additional contacts (see Table 57).

In the **Netherlands**, BTG has held many 1-on-1 meeting with non-formal education providers. Among the most successful and impactful are:

- An online meeting held in autumn 2023 with the environmental education NGO Natuur- en Milieu Overijssel (NMO). This meeting became the starting point of a collaboration between the secondary school Bonhoeffer College and BTG, in the context of the NMO programme Advisors of the Future. Within this programme, pupils of Bonhoeffer College will develop various bioeconomy-related games and game concepts.
- A face-to-face meeting was held on 14 November 2023 in Delfzijl, which led to the collaboration with the foundation Stichting Groener Groningen, organisers of the sustainable fashion festival Kleer'nZooi (to be held in October 2024 in Groningen)
- An online meeting held in November 2023, followed by a face-to-face meeting held in The Hague on 15 December 2024. This was the starting point for a broad and successful collaboration with the educational museum Museon-Omniversum in The Hague. See section 3.
- An online meeting was held on 8 March 2024, which led to the collaboration with the organisers of Expeditie NEXT, the main national science festival, held annually in a different location in The Netherlands.

In **Portugal**, LOBA held individual meetings with different multipliers in the context of the organisation of WP2 events and formats in Aveiro and online, namely: Planetiers World Gathering organisers (GenB participation in Planetiers World Gathering 2023), Ludus Association, the Association of Mathematics Teachers, the Portuguese Mathematics Society, and Agência Ciência Viva, University of Aveiro (Bioeconomy Changemakers Festival, Aveiro edition, 14 March 2024), four schools of the 1º ciclo of the municipality of Gaia (May 2024).

In Slovakia, PEDAL conducted individual meetings with various multipliers to foster collaborations and promote bioeconomy education.

- On January 15, 2023, a physical meeting was held with the Leisure Centre Gessayova team in Bratislava. The team was already familiar with sustainability and circular economy topics, but bioeconomy was new to them. After receiving explanations and support, they realized they were already engaging in related activities and developed their ideas for implementation. Key needs identified included high-quality educational materials, comprehensive training, and ongoing support for long-term activities.
- On February 20, 2024, an online meeting took place with the Development Agency of the Zilina Self-Governing Region. Since the agency is directly linked to regional policies, aligning bioeconomy initiatives with regional priorities was crucial. The discussion highlighted the need for high-quality educational materials that are easy to use and understand.

- On March 13, 2024, during the Bioeconomy Changemakers Festival in Nitra, PEDAL met with representatives of the Banska Bystrica Self-Governing Region. The region aspires to become a leader in bioeconomy education and is actively seeking ways to engage more teachers and educators. The GenB materials were of significant interest to them. Discussions emphasized fostering collaborations with formal education institutions, stakeholder engagement, and access to practical educational resources.
- On January 19, 2024, PEDAL held two separate online meetings. The first was with Slovak Eco-Quality, an organization already active in sustainability. The focus was on identifying synergies between existing activities and the GenB project, with opportunities for joint initiatives. The second meeting was with Europe Direct Nitra, which is dedicated to raising awareness about the European Union. Bioeconomy was seen as a relevant topic through which they could communicate EU priorities, leading to discussions on potential joint activities.
- On August 23, 2024, PEDAL met online with representatives of BioPark Slovakia. The region aims to be a pioneer in bioeconomy, with education as a priority. They have developed their initiatives and are looking for ways to engage more educators. The GenB materials were identified as valuable resources for their efforts.
- From June 23 to 25, 2024, PEDAL met with representatives of Envirocentrum Banská Štiavnica in Banská Bystrica. Similar to previous discussions, the focus was on strengthening bioeconomy education in the region, attracting more teachers, and leveraging GenB materials to support learning initiatives.

At a **Pan-European** level, since EUN does not work with other multipliers than Ministries of Education or formal education teachers, they organised this activity as a short video, part of a Scientix TV episode, featuring educators discussing different STEM topics applicable in non-STEM subjects and fields. Among other topics, teachers discussed bioeconomy and GenB project, as well as the benefits of including the topic of bioeconomy. EUN's video has been disseminated across a wide range of project multipliers, such as Ministries of Education, policymakers, teachers, non-formal educators, industry, researchers and beyond.

Second Reporting Period (since May 2024)

In **Italy**, APRE organised one-to-one online informative meetings with ANCI Lazio, partner in Horizon 2020 HOOP, European Bioeconomy Bureau and Food+i Cluster, partner in Horizon BRILIAN project, presenting the project and the main activities, as well as the most relevant results and exploitable formats of the project. APRE, on behalf of GenB Project, has also signed a collaboration agreement with BRILLIAN to promote joint education, communication and dissemination of materials and actions. As a result, BRILIAN has designed a new flap for the new version of the Book for Kids.

Always in Italy, FVA engaged different multipliers through one-to-one online meetings, such as ToScience, One Ocean Fundation, EU4Ocean Coalition (Blue Schools).

In **Greece**, Q-PLAN and HSPN organised 3 bilateral events with 3 multipliers. More specifically, the first online meeting was held with a Biomimesis Farm that implements educational programmes for adults and children on 17 October 2024 (by Q-PLAN). A second online meeting was held with a European Outdoor Education Hub on 25 October 2024 (by Q-PLAN). A third meeting was organised in-person (by HSPN) with the Science United Project, a science educator and teacher training NGO, on 23 October 2024. The meetings also supported the promotion of the informative webinar which was to be organised later (see Task 2.5a above).

In **the Netherlands**, BTG staff continued holding 1-on-1 meetings with relevant education providers. Among the most successful and impactful were:

- Three meetings, during Q2-Q3/2024, with the leader (Gabriela Matouskova) of the European Researchers' Night project team @ the RUG Schools for Science & Society. This contact led to BTG's participation in the 2024 edition, held in Groningen.
- More than 25 meetings (two online; the rest in person) with staff of Bonhoeffer College (Enschede), to discuss and develop the general set-up and overall progress of the collaboration (5 meetings), hosting biorefinery study visits (6 meetings), giving guest lessons at school (7 lessons), school assignment grading sessions (6 meetings), etc.

In connection with Kleer'nZooi (Groningen), Dutch Design Week (Eindhoven), and beyond (Enschede): in-person meetings with bio-based textiles experts from: Aalto University (Finland), Wageningen UR (Engage4Bio project), Over-Lap (Enschede), Wad van Waarde (Zoutkamp) and Textielhub Groningen (Groningen).

In **Spain**, AIJU organised three (3) online meetings with representatives from FEBiotec, Surfrider Foundation and Valencian Toy Museum to explore potential collaborations and share details about the GenB project. The meetings served as an initial point of contact, during which the general objectives of the project were presented, along with an introduction to its most relevant outcomes. All three meetings had positive outcomes: the three entities expressed interest in a follow-up session (informative webinar) to gain a more detailed understanding of the materials they had selected (see Task 2.5a).

In the meeting with FEBiotec (Figure 43), Enrique Vásquez, Vice President and Head of the International Relations Area, and Rosa María Heredia, Researcher and Member of FEBiotec – GenB Ambassador Spain, participated. During the meeting, AIJU presented the GenB project, which generated notable interest among the participants.

Figure 43 – Individual meeting with FEBiotec and GenB Ambassador Rosa María Heredia.

Additional meetings were held with Pilar Avilés, Coordinator of the Valencian Toy Museum, and representatives from Surfrider Foundation (an NGO dedicated to protecting aquatic ecosystems). The meetings were productive, and collaboration agreements were made to promote the GenB project in various educational and environmental awareness contexts.

Table 57 presents a short overview of individual meetings organised.

Partner	Country	Venue(s)	Date(s)	Context
ZSI	Austria	Online	Nov 2023 – Apr 2024	Ökosoziales Forum Österreich; St. Gilgen eco school; ACIB GmbH
Q-PLAN	Greece	Thessaloniki / Online	17 and 25 Oct 2024	Biomimesis Farm, European Outdoor Education Hub
HSPN	Greece	Athens / physical	23 Oct 2024	Science United Project
APRE	Italy	Online	Dec 2023	Office of the Premiership
		Online	Dec 2023	UNITELMA Sapienza (Circular Bricks Coordinator)
		Rome	Mar 2024	WWF Italia
		Online	Apr 2024	Brillian HEU project
		Online	Mar 2023	Festival della Scienza di Genova 2023
		Online	Jun 2023	Trieste Next 2023
		Online	Mar 2024	La Piazza SRL Media company
		Online	Apr 2024	ANCI (Association of the Italian municipalities) – HOOP partner
		Online	Apr 2024	MOMO Editorial house
		Online	Mar 2024 – May 2024	ANCI Lazio
		Online	Apr 2024 – Jun 2024	European Bioeconomy Bureau and Food+i Cluster

FVA	Italy	Online	Apr 2023 – Feb 2024	Various in collaboration with CMQ Bioeco Academy, INPS, Sapienza University of Rome, Novamont, EU4Ocean
		Online	May 2024 – Dec 2024	Meetings with ToScience, One Ocean Fundation, EU4Ocean Coalition (Blue Schools)
BTG	Netherlands	Across NL	Oct 2023 – Dec 2024	NMO, St Groener Groningen, Museon, Expeditie NeXT organisers, RUG, Bonhoeffer, Kleer'nZooi, Dutch Design Week, Aalto University, Wageningen UR, Over-Lap, Wad van Waarde, Textielhub Groningen
LOBA	Portugal	Aveiro / Online	Sep 2023 – Mar 2024	Planetiers World Gathering organisers, Ludus Association, Association of Mathematics Teachers, Portuguese Mathematics Society, Agência Ciência Viva, University of Aveiro
PEDAL	Slovakia	Bratislava & Zilina region	Dec 2022 – Apr 2023	Leisure centre Gessayova, Bratislava, Development Agency of the Zilina region, Development Agency of the Banska Bystrica region, Europe Direct Nitra, Slovak Eco-Quality
AIJU	Spain	Online	Dec 2024 – Feb 2025	FEBiotec – Spanish Federation of Biotechnologists; Surfrider Foundation Spain; Valencian Toy Museum
EUN	Pan-European	Online	Jun 2023	Video recording with Scientix

Table 57 - WP2 format 2.5b: individual meetings with multipliers- events organised.

Table 58 describes the targets, the KPI and the actual participation/implementation numbers.

Parameter	**Value**
Target countries	8
Countries with implementation (largely) completed	7
Countries with ongoing or planned implementation	1
Events implemented	>20

Participants engaged	> 1000 multipliers (including 3 in AT, 3 in EL, 16 in IT, 10 in NL, 11 in PT, 7 in SK, 3 in ES, 985 in EU).
Targets to be engaged	24 multipliers

Table 58 - WP2 format 2.5b: Individual meetings with multipliers - impact against KPI.

From the text and from the two tables above (on Activities and on Impact) it can be seen that **the implementation of the activities is completed** and the KPI is reached successfully.

7.2.3 Main lessons learned

The meetings with multipliers showed the interest of organisations in the topic of the bioeconomy. At the same time, however, awareness of this topic is low, even among organisations working on the topic of sustainability or the environment. For further cooperation, it is important to find a connection with their current activities and offer materials, and activities that can be further used by organisations. Organisations working with children particularly appreciated the book “What's Bioeconomy?”. For other activities, it might be needed to show examples of specific activities using the materials or directly organise a joint activity.

Bioeconomy-related events are a great place to network and connect with people who have similar goals to that of the project, hence enabling collaboration.

8. Conclusions

8.1 General conclusions and observations

Work in WP2 involves the implementation of a **wide variety of activities/formats across GenB partner countries**. The partners have a certain flexibility in how they apply certain formats in their country or region. Since the start of WP2 all GenB partners have started implementing them with a lot of enthusiasm.

Collaboration is always sought with (formal and non-formal) **educators and other multipliers**. This requires GenB partners to monitor the offering of (science, innovation, and sustainability) festivals in their respective geographies and of other opportunities to work with educators and multipliers.

Where, and to the extent, needed GenB activities in WP2 are **tweaked to best fit the local context and setting**, to achieve synergies and maximum impact. This also means that the exact timing of implementing the GenB activity may be dictated by the local situation and/or collaboration partner.

Good examples of successful collaboration are the national satellite events (co-) organised in the context of the EC Bioeconomy Changemakers Festival in March 2024. By working together with other (European and national) projects, and with key public and private bioeconomy actors (such as universities, governments, and companies) GenB partners in Greece, Italy, Portugal, and Slovakia succeeded in implementing diverse and entertaining packages combining awareness raising, knowledge exchange, and informing on jobs and career opportunities. This type of collaboration is just one example of the many established in GenB.

In the implementation of WP2 activities/formats, **smart use is being made of the legacy** of earlier EC-funded bioeconomy awareness raising projects, such as BioBridges, BioVoices, BioWays, BLOOM, and Transition2Bio. Where suitable and practical, GenB builds on, expands, and/or improves existing tools and materials, including bio-based product collections, D&C materials, good practice examples, etc. A full overview of materials developed by GenB partners in these earlier projects is available in the online repository of GenB. For usage with GenB target groups, in particular young people 5-19 y.o., in GenB countries, and in a specific context and setting, existing materials normally need to be modified i.e. translated into relevant languages, refined to reflect local/regional preferences/opportunities, and reworded in an appropriate tone of voice.

Beyond this “upcycling” of existing materials, for use in other countries and settings, partners also **develop and pilot innovative formats and associated educational materials** in GenB. Examples of these are Inside the Bioeconomy experiential exhibit in Task 2.1 and the Role-play game on bioeconomy jobs in schools in Task 2.2. In some cases, additional formats and associated materials were developed and piloted that were not even foreseen/pre-identified in the GA. Examples include **Participatory photography** (categorised under Task 2.1, described in

Section 3.5) and **Storytelling on bioeconomy for kids** (categorised under Task 2.3, described in Section 5.4)

Just like the existing formats, these new formats are also **finding their way from one GenB country to the other**. To help identify such international exchange opportunities, GenB partners periodically exchange overviews of their planned activities in WP2.

Due to the large number of WP2 formats and activities, and the need to adjust to time windows often set by external parties, **day-to-day monitoring of WP2 implementation** is not an easy task. Even if they wanted, the task leaders and the WP leader have limited room to steer the WP2 implementation in each country. General WP2 implementation progress is monitored instead by updating the joint Implementation Plan (D2.1) every six months and by country-by-country discussion of planned activities every three months.

8.2 Format-specific observations

In general, **combining different formats seems to be a good idea**. The different elements can strengthen each other. Frequently occurring is the combination of hands-on activities for young kids, BioArt Gallery roll-up banners, and the bio-based product collection. But other combinations can be effective too, as proven during the satellite events organised in 4 GenB countries in the context of the EC Bioeconomy Changemakers Festival in March 2024.

Also, in the implemented schools' projects to grow future bioeconomy entrepreneurs it was concluded that leveraging existing, well-established initiatives (like the Startupper School Academy and Bioeconomy4YOU for school projects) offers numerous advantages. These initiatives yield higher impact compared to standalone projects, since they benefit from greater promotional resources and organisational support, and reach a wider visibility through partners' communication channels, including media coverage. In addition, collaboration with external partners enriches programme content and prize offerings. The capacity building package developed in the schools' projects can be used in other GenB tasks or activities. It is key that tutors responsible to follow the students in their day-by-day implementation of the programme are empowered to ensure a valuable outcome for the school project.

From the implemented **career info days**, it was concluded that the format is a learning opportunity not only for students but also for seasoned professionals who learn how to invite young and future professionals to join through imaginative and practical ways. The participation of **young speakers** was attractive for the audience who empathised more easily with the speakers. Moreover, younger speakers used a simple language enriched by practical examples that supported the students to become familiar with the different green job sectors. **Targeting individuals who must choose their study or work pathway** (such as students in the final years of high school, young adults, and early-stage professionals) is most meaningful. There is a higher probability for them to make career choices in sustainable fields in general, and bioeconomy in particular, based on the information received. **Storytelling (career testimonials) and speaker**

diversity is essential for inspiration and resolving misconceptions, conveying the message that bioeconomy is a broad, interdisciplinary field accessible to all. Finally, students need **concrete and practical information** on bioeconomy career pathways and infrastructure in the region for education and skills–building.

Appendix 1: List of formats and format leaders

#T	Activities (formats)	Format Leader
2.1a	#8 "Hands-on labs" and playful activities in each country (KPI: #400 in total, #8 countries, #50 young people involved in each country, TARGET GROUPS: pre/early, teachers and multipliers)	FVA
2.1b	#4 "Bioeconomy village" at large scale events (KPI: #40,000 in total, #4 countries, #10,000 young people involved in each country, TARGET GROUPS: (1) pre/early, (2) elementary, (3) high school	PEDAL
2.1c	#4 **"**Inside the bioeconomy**"** experiential exhibitions (KPI: #4,000 in total, #4 countries, #1,000 young people involved in each country, TARGET GROUPS: (1) pre/early, (2) elementary, (3) high school, (4) multipliers	BTG
2.1d	#8 "BioArt Gallery" (in 8 languages) (KPI: #40,000 in total, #5,000 young people involved in each country, TARGET GROUPS: (1) elementary, (2) high school, (3) teachers, (4) multipliers	PEDAL
2.2a	#3 "Role-play game" on bioeconomy jobs in schools (KPI: #150 in total, #3 countries, #50 young people involved in each country, TARGET: (1) pre/early and (2) teachers)	AIJU
2.2b	#3 "TEDx pitches" (KPI: #240 in total, #3 countries, #80 young people involved in each country, TARGET GROUPS: (1) elementary, (2) high school, (3) multipliers	FVA
2.2c	#4 "Bioeconomy careers info days" (KPI: #300 in total, #4 countries, #75 teenagers involved in each country, TARGET GROUP: (1) high school	APRE
2.2d	#3 **"**A Day in a biorefinery" study visit (KPI: #100 in total, #3 countries, #34 teenagers involved in each country, TARGET GROUP: (1) high school	BTG
2.2e	#1 "Schools' projects" to grow future entrepreneurs (KPI: #5,000 in total, # 1 country, #5,000 teenagers involved in Italy, TARGET: (1) high school and (2) teachers)	FVA
2.3a	#24 Educational activity using the toolkits (KPI: #720 in total, #8 countries, #90 young people involved in each country, TARGET GROUPS: (1) pre/early, (2) elementary, (3) high school, (4) teachers	AIJU
2.3b	#8 "Bioeconomy talks/seminars" inquiry-based learning (KPI: #400 in total, #8 countries, #50 young involved in each country, TARGET GROUPS: (1) high school, (2) teachers	BTG
2.3c	#1 "Online bio educational village" in English (KPI: #5,000 young people in total, TARGET GROUPS: (1) elementary, (2) high school, (3) teachers	BTG + FVA
2.4a **2.4b** **2.4c**	Educating teachers in teaching the bioeconomy #1 "What's Bioeconomy" MOOC #3 "How to use GenB toolkits" #1 "Bioeconomy job profiles" on factsheets explanation TARGET GROUPS: (1) pre/early, (2) elementary, (3) high school, (4) teachers. KPI-1: #800 teachers, #8 countries, #100 teachers in each country. KPI-2: #12,000 young people, #1,500 in each country	EUN EUN EUN
2.5a **2.5b**	#8 Informative webinar in partners' countries #24 individual meetings with 3 multipliers in each country TARGET GROUPS: (1) pre/early, (2) elementary, (3) high school, (4) multipliers. KPI-1: #80 multipliers, #8 countries, #10 multipliers in each country. KPI-2: #4,000 young people, #500 in each country	PEDAL

Figure A 1 – Formats, Key Performance Indicators / Target Groups and Format Leaders.

Appendix 2: Distribution of activities (formats)

#T	Activities	AT	EL	IT	NL	PT	SK	ES	Pan-EU
2.1a	#8 "Hands-on labs" and playful activities	ZSI	QPL/ HSPN	APRE/ **FVA**	BTG	LOBA	PEDAL	AIJU	EUN
2.1b	#4 "Bioeconomy village" at large scale events	-	HSPN	APRE/ FVA	-	LOBA	**PEDAL**	-	-
2.1c	#4 **"**Inside the bioeconomy" experim. exhibitions	-	-	-	**BTG**	LOBA	-	AIJU	EUN
2.1d	#8 "BioArtGallery"	ZSI	QPL/ HSPN	APRE/ FVA	BTG	LOBA	**PEDAL**	AIJU	EUN
2.2a	#3 "Role-play game" on bioeconomy jobs in schools	-	HSPN	-	-	-	-	**AIJU**	EUN
2.2b	#3 "TEDx pitches"	-	-	**FVA**	-	-	PEDAL	-	EUN
2.2c	#4 "Bioeconomy careers info days"	-	QPL	**APRE**	-	-	PEDAL	-	EUN
2.2d	#3 **"**A Day in a biorefinery" study visit	-	-	APRE	**BTG**	-	-	-	EUN
2.2e	#1 "Schools' projects" to grow future entrepreneurs	-	-	APRE/ **FVA**	-	-	-	-	-
2.3a	#24 Educational activity using the toolkits	ZSI	HSPN	APRE/ FVA	BTG	LOBA	PEDAL	**AIJU**	EUN
2.3b	#8 "Bioeconomy talks/ seminars" inquiry-based learning	ZSI	HSPN	APRE/ FVA	**BTG**	LOBA	PEDAL	AIJU	EUN
2.3c	#1 "Online bio educational village"	-	-	**FVA**	-	-	-	-	-
2.4a **2.4b** **2.4c**	Educating teachers in teaching the BE #1 "What's Bioeconomy" MOOC #3 "How to use GenB toolkits" #1 "Bioeconomy job profiles" on factsheets explanation	 ZSI ZSI ZSI	 HSPN HSPN HSPN	 APRE/ FVA (3X)	 BTG BTG BTG	 LOBA LOBA LOBA	 PEDAL PEDAL PEDAL	 AIJU AIJU AIJU	 **EUN** **EUN** **EUN**
2.5a **2.5b**	#8 Inform. webinars #24 individual meetings with 3 multipliers	ZSI ZSI	QPL QPL	APRE/ FVA (2X)	BTG BTG	LOBA LOBA	**PEDAL** **PEDAL**	AIJU AIJU	EUN EUN

Figure A 2 – Geographical distribution of activities (formats).

NB1: EUN through calls will ask for support to the teachers of its pan-European network. **NB2:** Target countries of some activities (formats) may vary depending on emerging opportunities.

Appendix 3: Extra information for activities implemented in Spain

Inside the bioeconomy experiential exhibitions (T2.1c)

In Spain, AIJU conducted a total of 22 workshops as part of its ToyLab Experience, welcoming school visits during the morning sessions and families in the afternoon. These activities took place between June 2024 and February 2025.

Students from preschool to sixth grade from 12 different schools participated in the ToyLab Experience, involving a total of 726 students and 50 teachers, who acted as multipliers. Additionally, 167 children attended the toy library during the period in which the Inside Bioeconomy Experiential Exhibition was active, accompanied by their families. Among these accompanying visitors, 189 were parents, grandparents, or guardians, who also acted as multipliers. Therefore, the total number of attendees by age group was as follows: 893 children aged 4 to 12 and 239 multipliers, including teachers, parents, and grandparents.

The Inside Bioeconomy Experiential Exhibition organised by AIJU was structured around three main activities: (1) Bio-Based Experiments; (2) Bio-Based Product Showcase and (3) BioArt Gallery.

Bio-based experiments.

Students engaged in hands-on experiments designed to introduce them to bio-based concepts. Two specific experiments were developed. The first, “Explosion of Life! Seed Bombs Workshop”, focused on the use of seeds mixed with flour, compost, and water. This combination allowed controlled germination and plant growth, fostering interest in natural processes and sustainability awareness. This experiment was adapted from the *What’s Bioeconomy?* book, part of the GenB toolkit (Figure A 3).

Figure A 3 – Seed bomb experiments in the ToyLab Experience.

The second experiment, “Biogas: Energy or Magic?” involved the creation of biogas using eggshells and vinegar. In this activity, children observed how the reaction between these components generated gas, inflating a balloon attached to a plastic bottle, illustrating the concept of bio-based energy production.

Bio-based product showcase

A dedicated area within the exhibition displayed an extensive collection of bio-based products from the project. Given the toy library context, AIJU also selected bio-based toys to be part of the showcase. These products, made from sustainable materials, aimed to raise awareness of the bioeconomy's relevance in everyday life.

Children explored tangible examples demonstrating how natural materials—such as corn, sugarcane, wheat, algae, wood, and almond shells—can be transformed into sustainable toys. An AIJU technician guided participants through the materials and explained their properties.

To reinforce the knowledge provided in the Bio-Based Product Showcase, AIJU designed a gamified activity called “*EcoMemory: Discover Bio-Based Materials*” (Figure 12, Section 3.3).

This interactive game challenged children to identify the raw materials used in various bio-based products. The game began with participants rolling a die that displayed six different raw materials commonly used in bio-based products. Based on the material shown, each player selected a product they believed was made from that specific material. They then checked the product’s label to verify their choice. If their guess was incorrect, the product was returned to its original place. However, if they were correct, the facilitator allowed all children to observe and discuss the product’s characteristics before the player kept it for scoring. The game continued until all products had been identified, and the participant who correctly matched the most products was declared the winner.

The aim of this activity was to enhance learning through a fun and dynamic approach, reinforcing key bioeconomy concepts.

BioArt Gallery

As part of the Inside Bioeconomy Experiential Exhibition, AIJU also presented the BioArt Gallery, composed of 8 panels (Figure A 4).

Figure A 4 – BioArt Gallery at ToyLab Experience within the context of the Inside Bioeconomy Experiential Exhibition.

This exhibition provided children with an opportunity to explore informational displays on sustainable and bio-based materials, highlighting the most promising raw materials and their applications in the bioeconomy. Through visual illustrations and real-world examples, children gained insights into biologically sourced products. AIJU technicians used the BioArt Gallery to complement and reinforce the knowledge acquired through the EcoMemory game, ensuring a comprehensive learning experience.

Educational activities using the toolkits (T2.3a)

In Spain, the education of young people to promote the biotransition has been facilitated through various tools from the GenB Toolkit. Specifically, the following materials have been utilised: (1) *What's Bioeconomy?* book for children, (2) game-based experiences, (3) bioeconomy quizzes and educational cards, (4) video teasers and educational videos, and (5) online factsheets on job profiles. The following section details the use of each tool.

Use of the What's Bioeconomy? Book

This resource has been employed in different contexts, including:

- Workshops within the ToyLab Experience at AIJU, engaging school groups and families.

- Educational centres.

During the ToyLab Experience workshops, the book was used as an educational tool for 393 children aged 5 to 8 years old and 50 teachers. These activities took place between June 2024 and February 2025. The book was primarily utilised in its digital format to introduce fundamental bioeconomy concepts in a visually engaging and accessible manner.

At the start of each workshop, the digital version of the book was projected onto a screen in front of the seated children. This served as an introductory resource for younger participants, helping them grasp bioeconomy concepts. The facilitator first explained the concept of bioeconomy, after which the children were encouraged to choose scenarios from the book. An AIJU specialist guided them through the selected sections, reading the content aloud and fostering discussions or reflections on the most intriguing concepts identified by the children Figure A 5.

Figure A 5 – Children watching the What's Bioeconomy? book for kids at ToyLab Experience.

For family visits, beyond the guided workshop sessions, the digital book was continuously displayed on the screen, allowing families to navigate through its content independently.

Additionally, AIJU sent emails to its teacher database, inviting preschool and primary school teachers to implement the resource in their classrooms. Teachers integrated the book into their lessons, as illustrated in Figure A 6.

Figure A 6 – Various schools using the What's Bioeconomy? book for kids in their classrooms.

Educators found the topic highly engaging, as it provided an opportunity to update their knowledge and introduce sustainability concepts to their students. They particularly valued the tool for its strong visual appeal, highlighting the effectiveness of its illustrations and drawings in capturing students' attention and facilitating concept comprehension. Comprehensive feedback on the resource will be further detailed in Deliverable 4.3.

A total of 52 teachers reported using the digital book in their classrooms, generating an indirect impact on 1,196 children aged 4 to 8 years old.

Considering both implementation strategies—workshops at the ToyLab Experience (school visits and family participation) and the mailing campaign to AIJU's teacher network—the *What's Bioeconomy?* book reached a total of 1,589 children (both directly and indirectly) and 102 teachers.

Use of game experience

Both the *BioHeroes: Let's Save the Planet!* Card game and *The BioRace* board game have been implemented in the following contexts:

- Workshops at the AIJU ToyLab Experience, including school visits and family sessions.
- Local capacity building webinar
- KER assessment activities (for further details, see D4.1).

Within the ToyLab Experience workshops, a total of 500 children aged 9 to 12 participated in playing the *BioHeroes: Let's Save the Planet!* card game (Figure A 7).

Figure A 7 – Different gameplay sessions of the BioHeroes: Let's Save the Planet! card game.

Within the local capacity building webinar that took place on November 2024, 25 children from 11 to 12 years played with the *BioHeroes: Let's Save the Planet!* card game (Figure A 8).

Figure A 8 – Children learning the instructions for BioHeroes: Let's Save the Planet! before playing, in the context of a local capacity building webinar.

Additionally, during the KER assessment activities, 50 children aged 7 to 8 engaged with *BioHeroes: Let's Save the Planet!,* while 100 children from 14 to 15 years old played *The Bio Race* board game (Figure A 9).

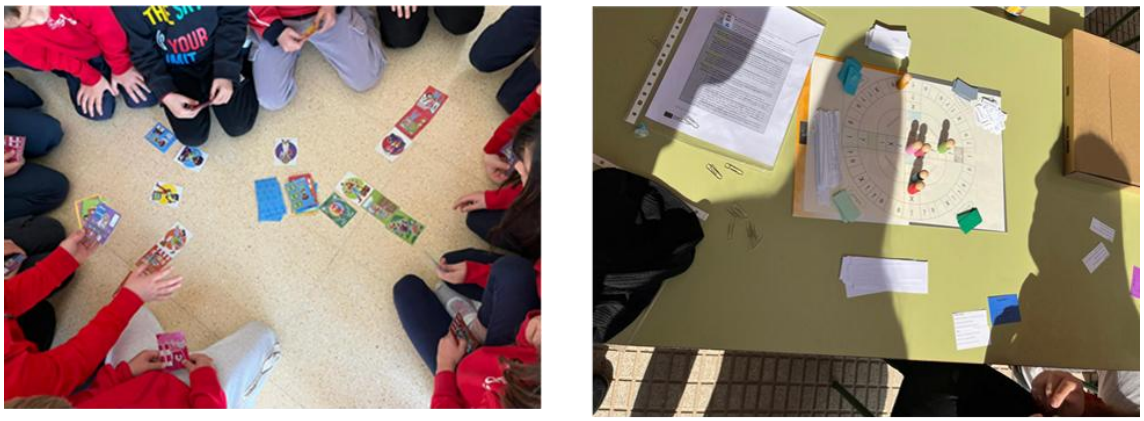


Figure A 9 – Children playing the card game BioHeroes: Let's Save the Planet! (left) and the board game The Bio Race (right) in the context of the KER assessment.

Considering Workshops at the AIJU ToyLab Experience and the KER assessment activities, in total, 650 children have utilised these two resources from the GenB toolkit.

Use of quizzes and educational cards

The quizzes and educational cards have been utilised in the following contexts:

- Posts on the social media accounts of Guía AIJU 3.0.
- Posts on the social media accounts of FEBiotec, Spanish Federation of Biotechnologists.
- KER assessment activities (for further details, see D4.1).

Both entities have scheduled the publication of the educational cards for February and March 2025. Figure A 10 presents an example of the initial posts on the Guía AIJU 3.0 social media platform. Each post introduces the topic covered by the educational card, encourages interaction, and redirects users to the project's Instagram account, @biovoices.

Figure A 10 – Examples of educational cards posted on Instagram Guia AIJU.

Through these two social media actions, it is estimated that at least 1,000 views will be reached by the end of the project.

Additionally, during the KER assessment, quizzes and educational cards were used as part of the materials to evaluate both the prior knowledge and the knowledge gained after using the GenB Toolkits. A total of 100 students aged 12–13 and 14–15 years utilised this material. The quizzes were programmed into a survey format, enabling the students to complete the test independently and receive their results. Figure A 11 illustrates the students participating in this context.

Figure A 11 – A class answering the quizzes from GenB toolkit.

In total, across social media campaigns and KER assessment implementations, 1,100 children and 30 teachers have engaged with these video teasers and educational videos from the GenB toolkit.

Use of videoteasers and educational video

The "*What is Made of?*" videoteaser collection and the *"What's Bioeconomy?"* educational video have been utilised in the following contexts:

- Workshops within AIJU's ToyLab Experience, involving school visits and families.
- KER assessment activities (for further details, see D4.1).

In the ToyLab Experience workshops, aimed at school visits and families, a total of 427 children aged 6 to 12 and 24 teachers watched the videos. During school visits, the activity was structured and guided: children sat in the stands while the video displayed a question. The video was then paused, allowing children to voice their guesses aloud before resuming playback to verify their answers. This interactive approach made the activity highly engaging. A more detailed evaluation will be provided in D4.3. For family visits to the toy library, the videos were

continuously projected on a screen, allowing families to watch them at their own interest and pace (Figure A 12).


Figure A 12 – Children watching the "What is Made of?" videoteaser collection at AIJU ToyLab Experience.

Additionally, during the KER assessment conducted in February 2025, 150 children aged 7–8, 12–13, and 15–16, along with six (6) teachers, visualized the educational video *"What's Bioeconomy?".* Figure A 13Figure A 12 shows children aged 7–8 watching it in their school.

Figure A 13 – Young people watching the " What's Bioeconomy?" educational video at schools as part of the KER assessment.

In total, across workshops at ToyLab Experience and KER assessment implementations, 577 children and 30 teachers have engaged with these video teasers and educational videos from the GenB toolkit.

Use of Online Factsheets – "Job Profiles"

The online factsheets about job profiles in the bioeconomy have been utilised in the following contexts:

- Local capacity building webinar.
- Schools

In the context of local capacity building, this activity was conducted with a class of 4th-year secondary education students (15–16 years old). A total of 25 adolescents participated in an informational session on career opportunities within the bioeconomy sector. The topics covered included: the fundamentals of bioeconomy, its practical applications in daily life, professions and sectors related to bioeconomy, and the BioHeroes card game: Let's Save the Planet! which aligned well with the topic. Additionally, the session utilised the online factsheets developed as part of the GenB Toolkit. This approach provided students with insights into emerging professional roles and potential career paths in the field (Figure A 14).

Figure A 14 - Young people aged 15–16 receiving information about job profiles in the bioeconomy.

Additionally, this activity took place at two of AIJU's partner schools in February 2025, involving two classes of 1th-year secondary education students (13–14 years old). A total of 50 adolescents engaged with this GenB Toolkit resource to enhance their understanding of the bioeconomy (Figure A 15).

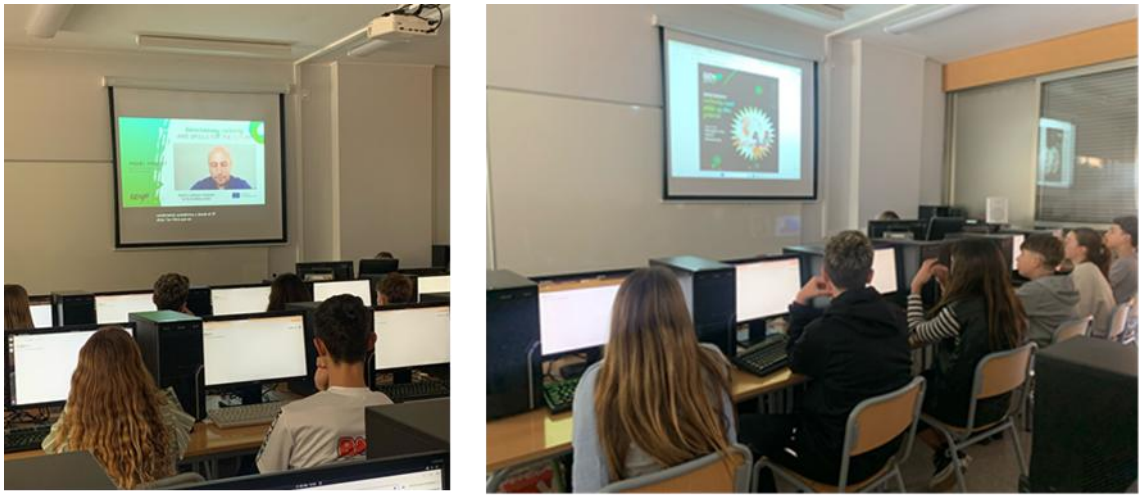


Figure A 15 - Young people aged 13–14 receiving information about job profiles in the bioeconomy.

In total, across local capacity building webinar and KER assessment implementations, 75 children have engaged with these online factsheets from the GenB toolkit.

Appendix 4: Report of the GenB MOOC: Bioeconomy for Educators

The GenB project and the Bioeconomy for Educators: Cultivating a Sustainable Future MOOC

GenB project aims to inspire and educate young people to accelerate the transition towards a more sustainable and circular behaviours and lifestyles. Focused on raising the Generation Bioeconomy (GenB), aware and sensitive about sustainability and circularity, through co-creation and cooperation with young people, parents, teachers; where the project provides formats, materials and toolkits on bioeconomy and bio-based sectors.

As part of the GenB project, European Schoolnet has designed and launched a Massive Open Online Course (MOOC) 'Bioeconomy for Educators: Cultivating a Sustainable Future' hosted on the European Schoolnet Academy platform. The aim of the MOOC is to deepen educators' understanding of circular bioeconomy concepts while equipping them with practical skills to integrate these principles into their teaching practices. The concepts of bioeconomy and circular economy were introduced, showing their relevance to everyday life. Participants discovered the jobs of the future in this field, and essential 21st-century skills required to become a bioeconomy expert. This allowed teachers to create more student-centred, innovative, and adaptable learning experiences while fostering problem-solving skills and a culture of continuous improvement. Lastly, participants constructed their resources on how to implement the topic most effectively in their educational settings.

The MOOC content included the knowledge and existing materials developed within the different projects preceding GenB, such as BIOVOICES, BLOOM, Transition2Bio, BioGov.net. In addition, throughout the course, participants were presented with a compilation of materials and resources developed within the project and the GenB Toolkit for teachers of all target groups, such as lesson plans, educational games, cards and quizzes, job profiles and more. The MOOC participants were, also, introduced to the 7-Steps of Eco-Schools Methodology, a series of measures to guide the schools in becoming more environmentally sustainable, while involving the whole school community in the process.

This document reports on various aspects of the MOOC, including the European Schoolnet Academy, the structure of the course, participant profiles, feedback, and overall conclusions.

The European Schoolnet Academy

The European Schoolnet Academy was launched in 2014 in response to the need to scale up professional development opportunities for teachers, to help them with the growing number of challenges they face in the classroom. The European Schoolnet Academy therefore primarily offers massive open online courses (MOOCs), which are entirely free of charge and open for anyone to join, with no limit to the number of participants. This focus on openness, and the pedagogical approach that goes alongside it, is based on three premises:

The need to cost-effectively scale professional development offers to larger numbers of teachers, to allow more teachers to access and benefit from these.

The conviction is that teachers need to be self-reflective practitioners, willing to interact with peers and with a high level of self-efficacy.

The fact that successful professional development encourages the development of learning communities where teachers share their expertise, according to research results.

The EUN Academy courses target teachers and other education professionals such as head teachers, ICT coordinators or school counsellors. The potential outreach of a course depends on the design of the course activities, the target audience, as well as the dissemination strategies utilised. A typical course on the Academy attracts between 300 and 2,000 teachers depending on the topic and target group.

Participant engagement on European Schoolnet Academy courses reaches far beyond the participants of the courses as a significant degree of activity generated on the courses happens via a range of social media channels. A typical course tweet profile reaches close to 100,000 twitter profiles. Dissemination of course activity by European Schoolnet's Ministries of Education has a significant reach into the national education communities.

The MOOCs offered through the European Schoolnet Academy run for a limited time, are tutored and upon successful completion of a course, participants receive digital badges and digital certificates. The MOOCs follow a connectivity and collaborative approach and include peer assessment between teachers. In 2023, the EUN Academy achieved an average course engagement rate of 68% and a course completion rate of 43% across 10 MOOCs.

Preparation, launch and live events

The GenB 'Bioeconomy for Educators: Cultivating a Sustainable Future' MOOC, co-organised with Scientix®, took place from the 14th of October to the 20th of November 2024 for a certification period on EUN Academy's platform and consisted of 4 Modules (see Table A 1). The MOOC participants were entitled to a certificate at the end of the certification period of 5.5 weeks, with 20 November 2024, as the final date on to finalise all the course activities. To receive it participants were required to take part in the course quizzes and develop the learning scenario together with the peer reviews by the completion of the certification period. Each module opened at the beginning of the week and remained open even after the certification period of the MOOC. Participants were able to go back to each module according to their time and needs for the whole duration of the certification period, as well as after the MOOC was archived. Participants were expected to dedicate a total of up to 25 hours to finish the course, with each module demanding approximately 5 hours of engagement. To conclude the course participants were required to construct a Learning Scenario to effectively implement bioeconomy topics in their teaching.

Module	Title	Date

Module 1	Bioeconomy – from B to Y opens	14/10/2024
Module 2	Bioeconomy in education: Best practices and challenges	21/10/2024
Module 3	Bioeconomy career awareness and teaching approaches	28/10/2024
Module 4	Your GenB Learning Scenario	04/11/2024

Table A 1 - Structure of the course and opening dates.

Participants had on average a week to complete the predicted workload for each module, complete the assignments and participate in the forum and social media discussions. Most of the participants actively promoted the MOOC on social media, especially through Facebook, X and LinkedIn. Following the end of week 4, participants were given one week and a half to complete the learning scenario they had been working on and the peer assessment task.

In the duration of the course, two live events took place:

- **Webinar 'Educating for bioeconomy: from classroom to community'** with GenB project partners.
- **TeachMeet 'Bioeconomy in the classroom: Teachers present their Learning Scenarios'**, where teachers presented their ideas, and explored possible activities or good practices for the learning scenario.

The content of the MOOC is available in Deliverable 1.3, and it can also be accessed via the following links:

- **EUN Academy:** https://www.europeanschoolnetacademy.eu/courses/course-v1:GenB+Bieconomy4Educators+2024/about
- **GenB Toolkit:** https://genb-project.eu/toolkits/?material=mooc

Participants' profile

Overall, 1,481 participants from 60 countries registered to take part in the MOOC, 947 educators took part in the course, reaching over 18, 940 students indirectly. Furthermore, 611 participants completed the course, achieving an engagement rate at 64% and a completion rate at 65%. The completion rate is higher than that reported for all EUN Academy courses taking place in 2024, suggesting that participants were particularly engaged with the content of the course.

In the map below (see Figure 1), the countries of origin and number of participants are displayed.

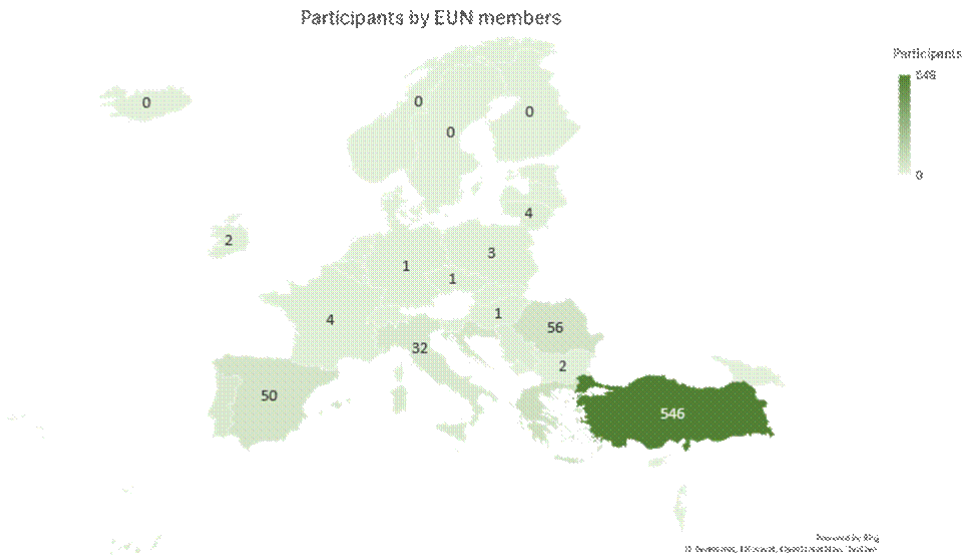


Figure A 16 – Country and number of participants.

Table A 2 provides an overview of the top 10 countries by the number of participants in the MOOC, along with the number of participants who successfully completed the course.

Participated in the MOOC:		Completed the MOOC:	
Country	**Number of participants**	**Country**	**Number of participants**
Turkey	546	**Turkey**	349
Greece	78	**Greece**	56
Romania	56	**Romania**	39
Spain	50	**Spain**	36
Croatia	40	**Croatia**	29
Portugal	34	**Portugal**	26
Italy	32	**Italy**	23
Serbia	12	**Serbia**	7
Albania	11	**Albania**	7
North Macedonia	11	**North Macedonia**	5

Table A 2 – Top 10 countries by number of participants that participated and completed the MOOC.

Before the course launch, a questionnaire developed by EUN Academy was distributed to all participants to gather insights into their backgrounds, including current position, gender, age, and years of experience in the education sector. The survey gathered a total of 96 responses, and revealed that most participants (72%) are female, the most prevalent age (see Figure A 17) between 36 and 45 (39%), and work as secondary school teachers (26%).

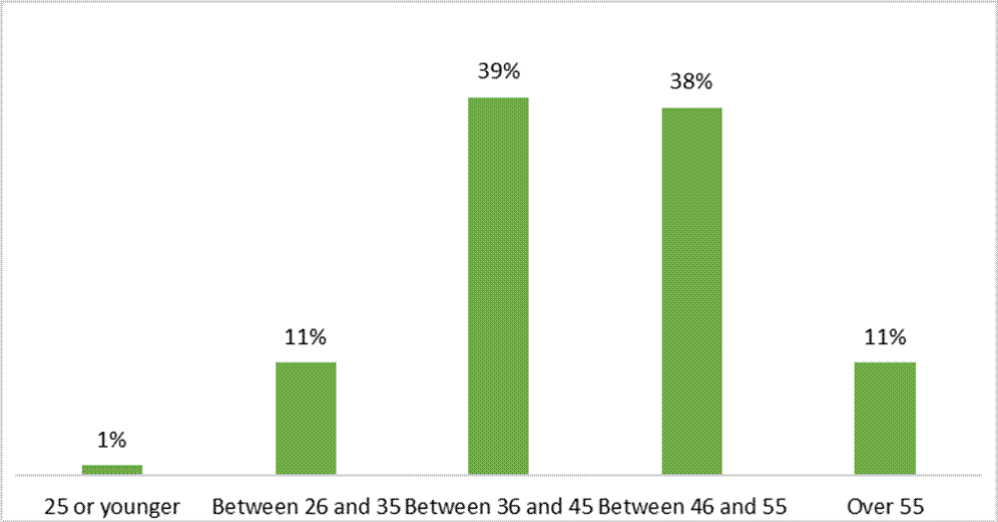


Figure A 17 – Participants' age.

Other roles (see Figure A 18) held by course participants include primary school teachers, teacher trainers, educators in initial training, and ICT coordinators/administrators. Most participants (40%) had more than 20 years of experience in the educational field (see Figure A 19).

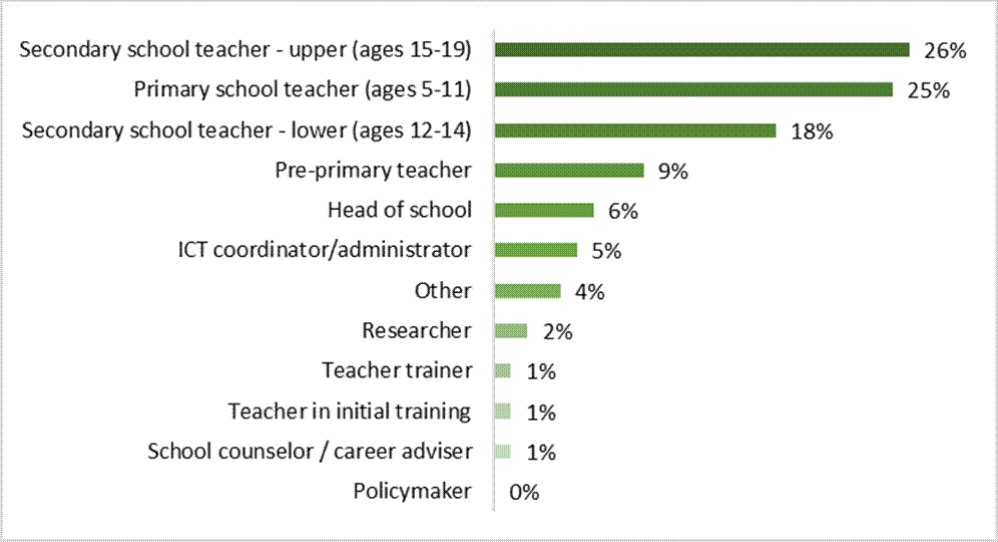


Figure A 18 – Participants' background.

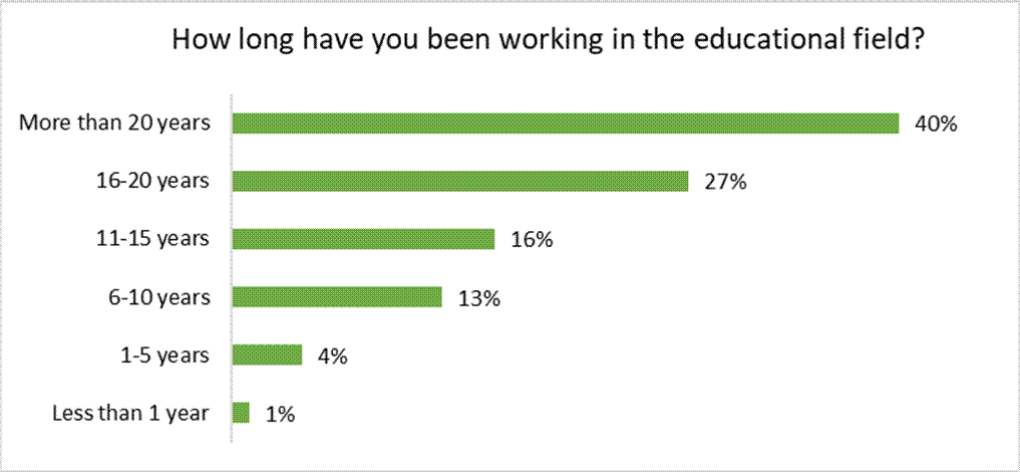


Figure A 19 – Years of professional experience of participants.

Participants' feedback and course impression

After the course concluded, an evaluation questionnaire developed by EUN Academy was automatically made available on the EUN Academy course platform to collect information and insights about participants' experiences during the MOOC. For the question regarding the overall value (see Figure A 20) of the course, all the 243 participants who responded, rated it as "Very good" (82%) or "Good" (18%).

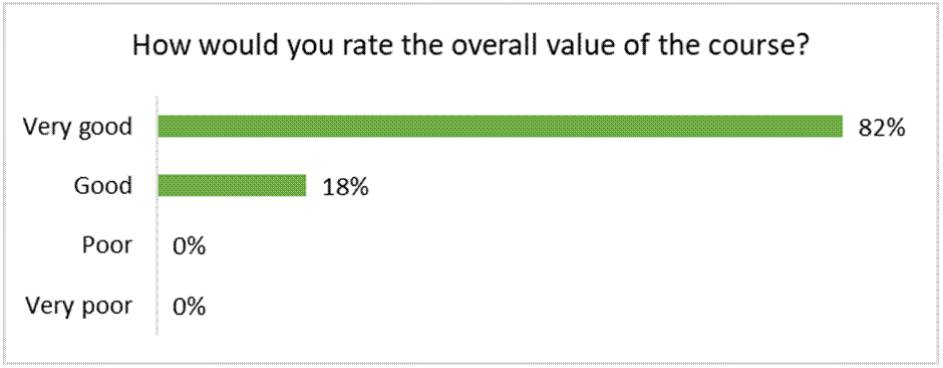


Figure A 20 – Participants' perception of the course value.

Participants were very satisfied with the course (see Figure A 21). Specifically, 98% said they would take a similar course again, 98% agreed that the course discussions were useful for their learning, and 98% felt the course quality met their expectations.

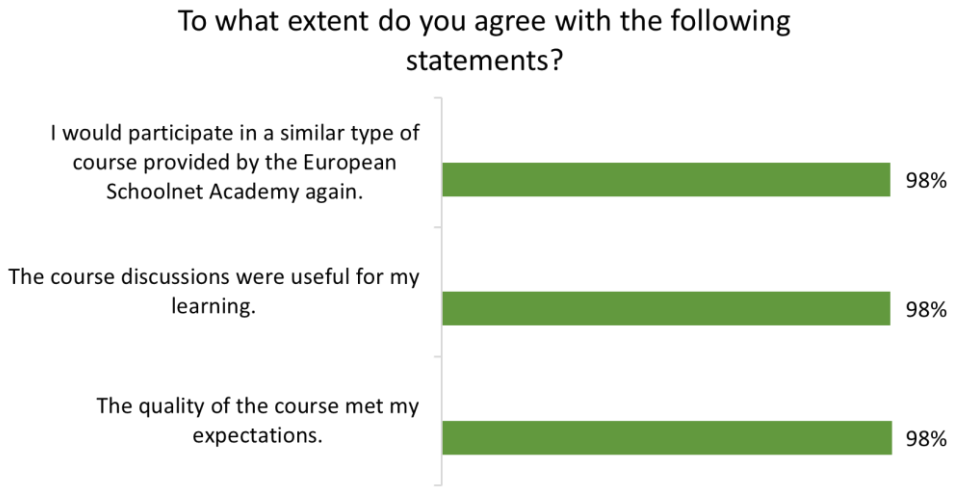


Figure A 21 – Participants' evaluation of course discussions, quality, and future enrolment in similar courses.

Regarding the course impact on participants' professional practice (see Figure A 22), a total of 94% of participants have already used ideas from the course, 99% feel more confident in teaching topics of circular bioeconomy. Additionally, almost all (99%) of the participants report an improved ability to reflect on their own practice, and all the participants intend to use the course ideas and examples in their everyday work. These results indicate that the course effectively enhanced participants' confidence in teaching about circular bioeconomy, encouraged practical application of climate-related topics in the classroom, and supported their professional growth as educators committed to addressing environmental issues.

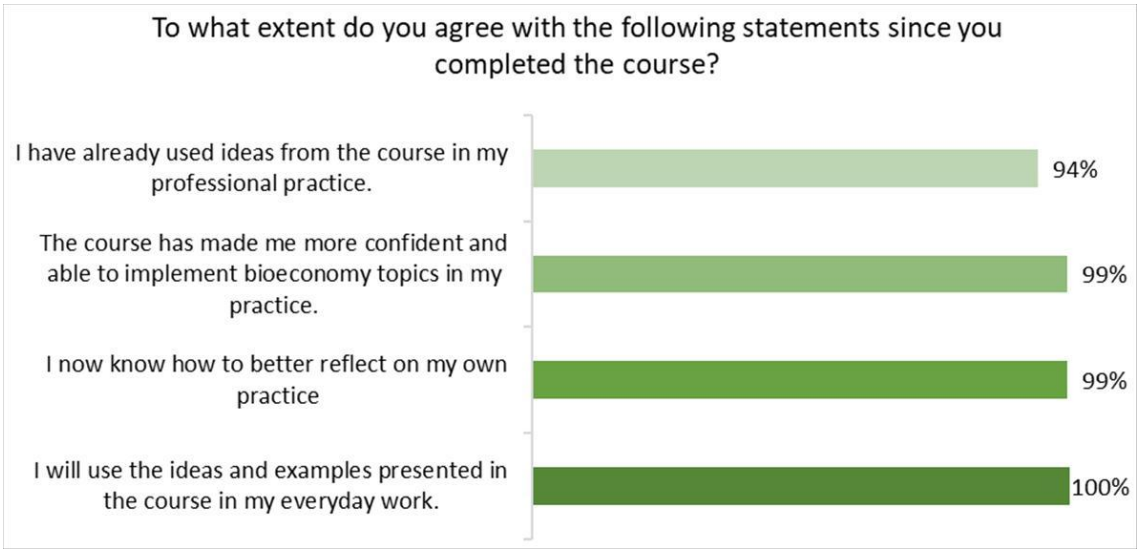


Figure A 22 – Participants' assessment of the course impact on their professional practice.

Participants were asked to self-assess their competence in addressing circular bioeconomy in their practice both, before and after taking the course. After completing the course, some

participants reported having strong knowledge and practical experience (26%), enabling them to advise and guide others, compared to only 6% before the course (a 20% increase). Similarly, the proportion of participants who felt they had a good understanding of the topic and were ready to implement it rose from 13% to 35%, reflecting a 25% improvement. Those seeking practical guidance to implement their knowledge decreased from 19% to 16%, indicating greater confidence in applying their learning. Furthermore, the number of participants who felt they had only basic knowledge slightly dropped, from 28% to 16% (a 12% decrease), while those with minimal awareness (wanting to learn the basics) fell significantly, from 38% to 5%. These results highlight the course's effectiveness in significantly improving participants' competence and readiness to address circular bioeconomy in their professional practice.

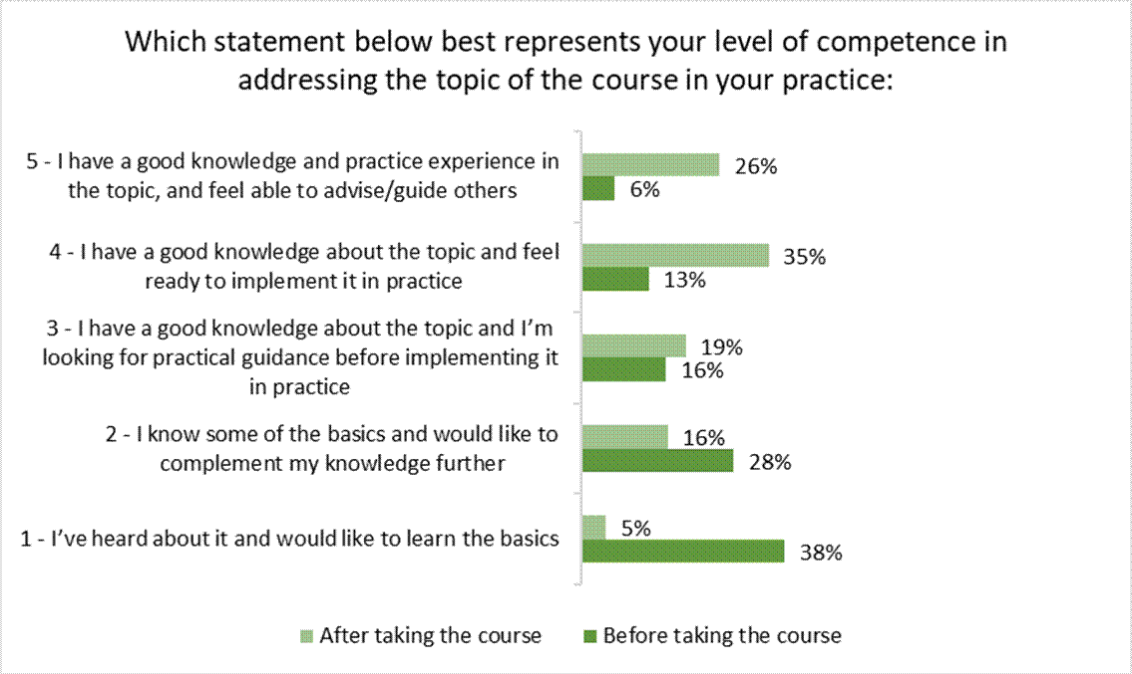


Figure A 23 – Pre-to-post change in self-assessed competence in teaching circular bioeconomy.

Besides responding to standard survey questions, participants had the opportunity to provide personalized feedback through open-ended questions.

Some **positive comments** from participants included:

- *"This course was a very productive and enjoyable experience for me. (…) I had the opportunity to improve myself in terms of both theoretical knowledge and practical applications. The content of the course was interesting and rich, which made my learning process even more effective. The knowledge I gained will contribute greatly to both my professional life and my personal development. This experience gave me new perspectives and was a guide for my future work. I would like to thank those who presented the course and everyone who supported it!"*

- *"I really became more sensitive about bioeconomy, how to use artificial intelligence in composting, I learned what work I can do in this field with my students, and I think I took a step to improve myself in this field, and I would like to thank everyone who worked on the program, which was prepared very well."*
- *"The subject of the course was amazing. I had never heard the word bioeconomy before. It was a great gain for me."*
- *"The course with all the materials presented was very well structured and interesting."*
- *"It made me realize that we were carrying out activities with students that could be related to bioeconomy."*
- *"The GENB library is full of very effective resources. '*
- *"The course made me more attentive to my students' behaviour."*

Some **suggestions** for improvement included:

- *"While the course was excellent overall, I would suggest including more information on the policy and regulatory frameworks that support bioeconomy development. This would help educators understand the broader context in which bioeconomy initiatives are implemented. It would be beneficial to have more opportunities for hands-on activities, such as experiments or simulations. This would help reinforce the learning and make the course even more engaging. I would also like to see more content on the social and ethical implications of bioeconomy. It is important for educators to be aware of the potential challenges and opportunities associated with this emerging field."*
- *"I think that Padlet activities could be replaced with a more user-friendly platform. I get lost in Padlet and this is why most of the times I don't even participate. The thing is that I don't really like the Padlet platform."*
- *"I would have liked the course to be more oriented to implement bioeconomy in any subject, it has been focused to science, biology and so on most of the time."*

It is important to note that all the results presented in the report are aggregated results collected using the pre- and post-questionnaires developed and provided by the EUN Academy. Questionnaires developed within the GenB project were also distributed through the MOOC content. The data collection and analysis were conducted by the consortium partner in charge of the task.

Conclusion

The GenB 'Bioeconomy for Educators: Cultivating a Sustainable Future' MOOC has proven to deepen educators' understanding of bioeconomy concepts while equipping them with practical skills to integrate them into teaching practices. Moreover, through the MOOC, teachers were provided with an opportunity to gain insights into the complexities of bioeconomy as a field, including its interdisciplinary nature and significance for sustainable development. They learned about the required skills and career opportunities in the field of bioeconomy and how to

facilitate students towards developing the necessary competencies to pursue them. They learned innovative teaching approaches tailored to effectively communicate bioeconomy concepts to students, fostering critical thinking and problem-solving skills. The course also provided opportunities for networking and collaboration among educators, enabling the exchange of ideas and best practices in bioeconomy education.

The results highlight the substantial impact of the MOOC on educators from 60 countries, with over 1,400 participants, reaching over 18,900 students whilst improving their knowledge and confidence in teaching circular bioeconomy. It effectively engaged a diverse group of participants from teachers, working with students aged 4 to 19, teacher trainers, school administrators, counsellors, as well as researchers. The high satisfaction levels reported by participants reflect the course's effective content, engaging format, and practical applicability, which contributed to their professional development. Participants highlighted the program's ability to enhance their professional practices, broaden their perspectives, and raise awareness about bioeconomy concepts.

Many participants indicated that the MOOC inspired them to integrate bioeconomy topics into their work, making them more attentive to students' behaviours and environmental issues. Resources like the GenB toolkits and library, as well as the collaborative opportunities with peers, were particularly emphasised as valuable for fostering a sense of community and shared purpose.

Some participants also noted the extensive nature of the content, the course successfully provided tools, ideas, and actionable insights, empowering participants to contribute meaningfully to addressing environmental challenges in education and beyond.

While feedback was mostly positive, suggestions for improvement, such as increased interactivity and hands-on activities, more focus on policy and regulatory aspects of bioeconomy, broader subject integration beyond science and biology, and a more user-friendly platform for fostering interaction, can further enhance the learning experience. Overall, the MOOC has successfully empowered educators to teach circular bioeconomy more effectively in their classrooms and schools.

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